Commercial Fisheries Abstracts

a monthly summary of important developments for the fishery industries

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DOUGLAS McKAY, Secretary

FISH AND WILDLIFE SERVICE

JOHN L. FARLEY, Director

Commercial Fisheries Abstracts

Prepared in the Branch of Commercial Fisheries

EDITORS

A. W. ANDERSON, Chief, Branch of Commercial Fisheries

DONALD Y. ASKA, Chief, Educational and Market Development Section

ASSOCIATE EDITOR

MAURICE E. STANSBY, Chief, Pacific Coast and Alaska Technological Research

ASSISTANT EDITORS

KATHRYN L. OSTERHAUG, Fishery Products Technologist, Seattle

F. BRUCE SANFORD, Chemist, Seattle

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The abstracts in this leaflet may be left in their present form; but it is suggested that to make the most efficient use of them, they be cut out on the lines designated and filed by the number in the upper left-hand corner of each. For a full description of this filing system see "Fishery Technological Abstract Card System" by Maurice E. Stansby and K. L. Osterhaug, Fishery Leaflet No. 232, obtainable free by request from Fish and Wildlife Service, Washington 25, D. C.

In addition to the regular abstracts, there is included a bibliography of references of secondary importance (without abstracts). These may be cut off on the lines designated and pasted on standard 3 x 5-inch cards for filing.

Following is a brief outline of this filing system. The numbers apply to the first digit appearing on each card. For the meaning of subsequent digits, please see the above described leaflet.

0	General and theoretical	5	Vitamins
1	Fish by species	6	Fishery byproducts
2	Fresh fish	7	Analytical Methods
3	Preserved fish	8	Composition
4	Oils	9	Miscellaneous

Issued with the approval of the Bureau of the Budget, December 29, 1953

0.32 THE FREE AMINO ACIDS OF FISH. 1-METHYLHISTIDINE AND β-ALANINE LIBERATION BY SKELETAL MUSCLE ANSERINASE OF CODLING (GADUS CALLARIAS)

Jones, N. R. (Torry Research Station, Aberdeen, Scotland)
Biochemical Journal 60, 1, 81-87 (May 1955)

Large increases in the free amino acids 1-methylhistidine and β-alanine occurred in codling during their storage in ice. The initial free β-alanine content of codling is almost always low; however, some variation in the initial free 1-methylhistidine content of codling has been found. The initial increases in these two amino acids during the first 2 days of storage in ice took place before the onset of bacterial invasion of the tissue. Therefore, the possibility of autolytic-type action was examined at various levels of the amino acid in sterile muscle suspensions that were incubated at 0° C. and 15° C.

Boiled muscle suspensions did not show an increase in free 1-methylhistidine and β-alanine, whereas the unboiled suspensions showed a large increase in these free amino acids.

Incubation of unboiled cell-free muscle extracts at 15° C. caused the accumulation of 1-methylhistidine and β-alanine (table 1, over). These free amino acids did not accumulate in boiled cell-free muscle extracts. When anserine was incubated with cell-free aqueous muscle extract, 1-methylhistidine and β-alanine liberation was increased (table 2, over). Probable cleavage of the dipeptide anserine by the thermolabile factor anserinase, a new muscle enzyme, was thus indicated.

Partial purification of anserinase obtained from cell-free extracts was carried out by dialysis and acetone fractionation. The anserinase obtained was activated by Zn^{2+}. High concentrations of Zn^{2+} were inhibitory. Evidence obtained indicated that the enzyme is naturally Zn^{2+} activated.

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 ABSTRACTER: Martin Heerdt

0.32 THE N-TERMINAL GROUPS OF SALMINE

Phillips, D. M. P. (Australian National University, Canberra, A.C.T., Australia)
The Biochemical Journal 60, 403-409 (July 1955)

Various 2:4-dinitrophenyl derivatives of amino acids (DNP-amino acids) were found to be characterized by their absorption spectra. DNP-L-proline and DNP-L-hydroxyproline have spectra unlike those of the derivatives of other amino acids. The shape of the spectrum of DNP-salmine indicated that proline is the N-terminal amino acid in salmine. Since hydrolysis is unnecessary and there are no lysine, histidine, tyrosine, or cystine residues in salmine, it is reasonable to assume an open-chain peptide structure, in which case the spectrophotometric estimation of the proportion of N-terminal amino acids would give the molecular weight of salmine.

Salmine sulphate prepared from salmine from mature chum salmon (Oncorhynchus keta) was used. The DNP-amino acids were prepared by the method of Sanger (1945). Spectra were measured in a Hilger ultraviolet spectrophotometer using 1 cm. silica cuvettes and slit widths corresponding to a band width of 5 angstroms.

Purified salmine from chum salmon coupled completely with 1-fluoro-2:4 dinitrobenzine; a secondary slow reaction (unexplained) also occurred. The spectrum of the resulting DNP-salmine was measured in the range 235-240 mμ., and was found to be similar to the absorption spectrum of DNP-proline. Of the N-terminal residues in salmine 80 percent were proline, and the remainder were mainly arginine, serine, and glycine. The average molecular weight of salmine as calculated from its absorption spectrum was 3800± 10 percent assuming all the molecules to be simple open-chain peptides. A small amount of N^{δ}-DNP-ornithine was found that may be a part of the native protamine and not a degradation product.

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 ABSTRACTER: Martin Heerdt

0.5 A REVIEW OF THE MICROBIOLOGY OF FROZEN AND CURED FISHERY PRODUCTS

Shewan, J. M. (Department of Scientific and Industrial Research, Torry Research Station, Aberdeen, Scotland)
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 2, pp 1-18 (November 1953)

Effect of freezing on the microbiological flora of fish.

1. Freezing causes an initial drop of 60 percent to 90 percent in the number of bacteria present. If the storage temperature is below the minimum for growth, the number of bacteria decline further during the storage. The heavier the initial load, the greater the number of survivors.
2. Freezing does not appear to affect the properties of the surviving microorganisms because thawed fish spoil at about the same rate as unfrozen fish.
3. The rate of freezing has no effect on the numbers killed, but repeated freezing and thawing is more lethal than single freezing and storage in the frozen state for the same time interval.
4. Bacterial cells can be protected by the presence of colloidal materials; thus there is a higher mortality in distilled water than in broth.
5. There is a higher mortality of bacterial cells at the higher pHs, especially the cold-sensitive strains.

Effect of salting.

The preservative effect of salt is due to (a) the restriction of microbiological activity as a result of the desiccation of the tissues; (b) the direct action of NaCl on the putrifactive microorganisms present; (c) the removal of oxygen and the sensitization of the microorganisms to CO_2; (d) the interference by the NaCl with the rapid action of the proteolytic enzymes.

In pickle curing, the flora consists mainly of halotolerant or halophilic micrococci, which grow easily in 10 percent to 15 percent salt agar and have a growth optimum of 37° C. In the cures stored at 10° C. to 15° C., the brine counts increase rapidly over the first 10 to 15 days, and decline slowly

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 ABSTRACTER: D. T. Miyauchi

0.6 MARINE CHEMISTRY

Weiss, Francis Joseph
Science 122, 151 (July 22, 1955)

The passage of the Saltonstall-Kennedy Act gave recognition to the importance of our marine resources and emphasized the significance of scientific research in maintaining a prosperous fishing industry. It added an amount not to exceed $3 million to the $3.5 million annual budget of the Fish and Wildlife Service of the U. S. Department of the Interior, and thus enabled this Government office, through its own scientific research staff or through contract work carried out by universities or research institutions, to attack many vital problems that previously could not be investigated adequately, if at all.

The trawler Delaware of the Fish and Wildlife Service is carrying out research work in the North Atlantic to find the best way of freezing fish in the round and storing frozen fish in the hold. One promising method is to immerse freshly caught fish in a sodium chloride brine of 10° F. Low temperatures can now be easily obtained by using dry ice and alcohol, which make an excellent cooling medium. Additions to the brine such as antioxidants, glucose, and sucrose are being tested for their capacity to improve the flavor and appearance of the product and to counteract undesirable effects of sharp freezing and long storage.

The exceptional value of fish meal and concentrated fish solubles as a source of protein of highest biological value, of vitamins, and of the not yet completely understood "growth factors," is now so universally recognized that they are widely used as feed supplement in animal and especially in poultry feeding. Small amounts of fish oil greatly improve the palatability and the nutrient value of poultry fodder, prevent dustiness, and preserve the carotene and vitamin-A content by acting as a link between

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ANSERINASE IN FISH MUSCLE

BACTERIOLOGY AND FISH PRESERVATION

THE N-TERMINAL GROUPS OF SALMINE

FISHERY TECHNOLOGICAL RESEARCH

0.5 (Cross References: 3.249, 3.5, 3.4)

to about 10 percent of the original number after about 2 or 3 months and may remain steady at this figure for at least another 6 months. The flesh of the pickle-cured fish, on the other hand, contains few microorganisms, and soon becomes sterile.

In dry salting, the flesh at the wet-stack state always contains some microorganisms, almost exclusively micrococci. There is little data on the flora of the finally dried product, but it is known that many halophilic types can survive drying and grow again when suitable moisture and temperature conditions permit.

The flora of the final salted product is influenced greatly both in types and numbers by the flora of the curing salts. Manufactured salts usually contain few microorganisms but solar salts usually contain a rich and varied microflora.

Most microorganisms present in salted fish fail to grow below 5° C., but at temperatures above 15° C. bacterial activity by the halophiles takes place.

The halophiles consist of asporogenous rods and micrococci, which are highly pleomorphic. As a rule, the optimum temperature of growth is 37° to 40° C. Many are strongly aerobic, appear to grow well at a relative humidity of 75 percent, and can grow well at pHs from 6 to 10. The problem of the mechanism of halophility is still unsolved.

Effect of smoking.

The four factors in the smoking process are (a) brining or salting, (b) drying, (c) treatment with smoke, and (d) treatment with heat. Of the four, smoking appears to be the most important factor affecting the keeping quality.

Studies indicate that bacterial spores are more resistant to the action of wood smoke than the vegetative or non-sporing bacteria and that molds and their spores are highly resistant. The bacteria present in fish tissues are protected somewhat from the full action of the smoke, and sterility of the product is hardly ever produced in cold smoking. In hot smoking, the products from the kiln are nearly sterile, with only a few heat-resistant cocci remaining alive.

It is still uncertain which group of the smoke constituents has the most effective bactericidal activity. Formaldehyde, tar fractions, fatty acids, and phenolic fractions are among those which have been suggested as having the most effective bactericidal activity.

0.6

vitamin or provitamin on the one hand and natural antioxidants on the other. Unfortunately, the amount of fish oil that can safely be added to poultry fodder without causing off flavors in poults and eggs is very limited, being 3 percent at most.

Fish oils, which once constituted the main product of the fish reducing industry, face heavy competition from animal and vegetable fats and oils. Moreover, the market is shrinking, owing to the partial replacement of soaps by synthetic detergents, and the use of synthetic resins in paints. In order to secure for the fish reducing industry a healthy economic basis, chemistry is again called upon to develop processing and utilization methods that will bring out the unique chemical properties of fish oils, thus giving them a competitive advantage over other fats and oils.

Considering the structure of the unsaturated fatty acids of fish oils, it is easy to see how splendidly they could lend themselves as starting points for numerous organic products, inasmuch as the dicarboxylic fatty acids obtained through their oxidative splitting are just the ones most in demand for synthetic plastics and fibers. Unfortunately, the hydrolysis of fish oil gives only a mixture of fatty acids that requires costly and uneconomic steps for separation into its constituents. However, recent methods of separation by way of cathrates (addition crystals of fatty acids with urea or thiurea) offer new and promising avenues of chemical utilization of fish oil that are now being intensively investigated.

Some of the major projects already undertaken under the Act are (1) studies to determine racial characteristics of salmon on the high seas; (2) research on fluctuation of the California sardine; (3) study of causes and control of toxic red tide off the Florida coast; (4) development of voluntary Federal grades and standards for fishery products; (5) development of chemical index and nutritive value of fish meal and development of new uses for fish oils; (6) exploration of deep-water fishing grounds in the North Atlantic.

0.32

Table 1. *Free β-alanine and 1-methylhistidine in extract incubates*

Samples of extract (2 ml. diluted to 3 ml. incubate volume) were incubated for 8 hr. at 15° unbuffered, initial pH 6·8. Free amino acids were determined by chromatography and spot elution.

Preparation	1-Methylhistidine (μg./ml.)	β-Alanine (μg./ml.)
Extract before incubation	20	8
Extract after incubation	110	51
Boiled extract before incubation	28	9
Boiled extract after incubation	25	10

Table 2. *Free β-alanine and 1-methylhistidine in extract incubates*

Extract (2 ml.) was incubated with and without anserine (10 mg); incubation time, 6 hr.; initial pH 6·9, unbuffered; temp. 15°; incubate volume, 3 ml. Estimated as in Table 1.

Preparation	1-Methylhistidine (μg./ml.)	β-Alanine (μg./ml.)
Extract before incubation	18	8
Extract after incubation	119	53
Boiled extract before incubation	24	11
Boiled extract after incubation	23	11
Extract + anserine after incubation	190	82
Boiled extract + anserine after incubation	24	10
Anserine control	0	0

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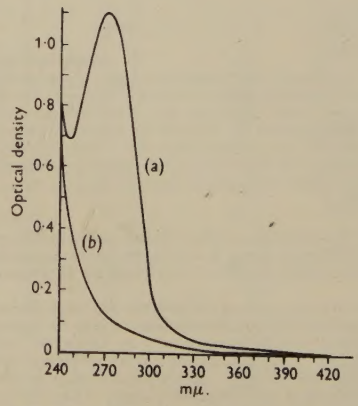

Fig. 2. The absorption spectrum of salmine: (*a*) before and (*b*) after chromatography on Dowex-2 OH^- resin. Concentration, 2·15 mg. salmine/ml. in 0·1 N-HCl.

1.01 YEARBOOK OF FISHERY STATISTICS PART I PRODUCTION AND CRAFT

Anonymous
Food and Agriculture Organization of the United Nations IV, Part 1, 249 pp, Rome (1955)

Brief outline of contents:
Section 1 -- Catch and landings. --In the first four tables (1-4), the total world catch of fish, crustaceans, mollusks, etc., is estimated and analyzed by groups of species, fishing areas, continents and regions, and countries.
The next 11 tables (5-15), one for each of the major groups of species, present catch and landings by countries and, under each country, by species. Tables 16 and 17 show the number of whales caught by countries and by area of catch.
Table 18 summarizes the catch data by countries and groups of species and Table 19 shows, for selected countries, landing data according to various classifications. The final six tables of this Section (20-25) group, for each continent, values of landings by countries, in terms of national currencies and United States dollars.

Section 2 -- Utilization. --In this section, one summary table and six tables for the continents present data on the disposition of the catch by groups of species and countries, and 22 commodity tables provide data on the output of processed commodities.

Section 3 -- Fishing craft. --Six tables show, for the continents fishing craft by characteristic categories in each of the reporting countries, while a separate table is devoted to shore statistics and craft in the whaling industry.

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1.10 SNAPPER SMACK LUCKY STRIKE BEGINS FULL-SCALE TUNA FISHING IN SOUTHERN WATERS

Anonymous
National Fisherman 36, 12 (June 1955)

The first full-scale commercial tuna fishing experiment in Caribbean and Gulf waters has been carried on since April 30. If this venture is successful, Pensacola, Florida may be famous for its tuna industry as well as for its red snapper fishing industry.

A specially equipped snapper smack, the Lucky Strike, will haul its catches to Ponce, Puerto Rico, where there is a cannery. A 25-mile nylon line carrying 1000 hooks baited with small mullet will be used. The Japanese method of taking fish has been adopted. A "line hauler", a power-driven reel-like device pulls the long line aboard the boat and coils it in baskets after the fish have been removed. Drop lines are suspended from the long line located about 72 feet beneath the surface of the water. Flags on bamboo poles mark the buoys which support the long lines. Drop lines may be as long as 72 feet, thus the baited hooks may be as much as 144 feet below the surface. A crew of five men is used.

Gaff hooks are used to help haul the larger tuna aboard. This practice helps avoid straining and tangling of the line. Yellowfin tuna will average more than 100 pounds each, and occasionally a bluefin weighing 700 pounds will be hooked. The long line may hold them in the water, but other means must be used to lift them onto the deck.

The Lucky Strike's venture has developed out of 2 years of experimentation in the tuna operation by the Fish and Wildlife Service. Operating out of Pascagoula, Mississippi, the Service's survey ship has also attracted interest for its investigation of shrimping conditions.

 ABSTRACTER: Lois Elgin

2.00 WIDENING HORIZONS OF FOOD RESEARCH

Anonymous
Food Manufacture 30, 198-199 (May 1955)

Freezing fish at sea. --The Torry vertical plate freezer will be used to freeze the first part of the catch of an Arctic trawler as part of an experiment in which four government agencies will share. Laboratory experiments to date have shown (1) that fish can be held in ice for as long as 3 days before freezing and (2) that samples of cod that had been frozen after being held in ice for unspecified periods were very acceptable. These cod were acceptable as freshly thawed fish and as raw fish for refreezing or smoking.

Fish quality. --Iced white fish quality has been found to be related to the quantity of total volatile base and trimethylamine produced in fish muscle during storage. The effect of certain fish-muscle constituents on palatability and other flesh factors will be determined. A muscle enzyme that is concerned with the metabolism of anserine, an important muscle constituent, has been isolated and named anserinase.

Antibiotics have been used for the first time in taxonomic studies of marine bacteria to separate pigmented and non-pigmented Pseudomonadeae from each other and from Vibrio species. Achromobacter also can be separated from non-pigmented Gram-positive and Gram-negative Bacterium by the use of antibiotics. This discovery is an important contribution to bacteriology that should facilitate work on the bacterial spoilage of fish.

The Torry Research Station is presently engaged in building a diesel-electric trawler of special design to supply their requirements for a new research vessel.

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 ABSTRACTER: Martin Heerdt

1.87 SOME NON-PROTEIN CONSTITUENTS OF THE TISSUES OF THE LOBSTER

Kermack, W. O.; Lees, H.; and Wood, J. D. (University of Aberdeen, Aberdeen, Scotland)
The Biochemical Journal 60, 424-428 (July 1955)

The water-soluble non-protein nitrogenous constituents of the muscle, hepatopancreas, and blood from lobster (Homarus vulgaris) were determined.

Removal of tissue. --To kill the lobster a spike was inserted below and behind its head. All of the blood that flowed from this wound was collected in a beaker. The shell was then cut open to facilitate removal of the hepatopancreas and the tail muscle.

Extraction. --Successive extractions with water and with alcohol were carried out on macerated lobster muscle and on macerated hepatopancreas from the same lobster. The total N of the individual extracts was measured.

Autolysis. --Lobster muscle or hepatopancreas was cut into small pieces and incubated at 30° C. in the presence of 1 milliliter of toluene in a stoppered flask.

Blood procedure. --The lobster blood congealed as fast as it was shed and collected. Congealed blood was extracted with ethanol in the same way as the muscle was extracted, then passed through a column of sulphonated polystyrene resin, and eluted from the column as amino acids with N NH_4OH. The displaced material was concentrated under reduced pressure and the solution was chromatographed.

Analytical methods. --Total N of the extracts was estimated by the micro-Kjeldahl method of Chibnall, Rees and Williams (1943). α-Amino N was estimated by the method of Pope and Stevens

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 ABSTRACTER: Martin Heerdt

YEARBOOK OF FISHERY STATISTICS

FISH QUALITY

TUNA FROM CARIBBEAN

NON-PROTEIN CONSTITUENTS OF LOBSTER

2.00 (Cross References: 3.234, 6.130)

Surplus herring. --Methods for the use of surplus herring in the manufacture of edible oil and meal for animal feeding have been established on a sound basis by the Herring Industry Board. At the present the Board is engaged in devising methods for preserving raw herring when they are landed in tremendous quantities at the peak of the run.

1.87 (Cross Reference: 8.59)

(1939). Trimethylene oxide was estimated by reduction to trimethylamine, and the amount of amine was measured. Glutamine amide N was estimated by the difference in volatile base N values attributable to the release of NH_3 from glutamine by 40 percent NaOH. Betaine N was estimated after precipitation with ammonium reineckate by colorimetric estimation of the reineckate in acetone solution. Arginine was estimated by the method of Dubnoff (1941), creatine and creatinine by the method of Folin and Wu (1919), and amino acids by the methods of Fowden (1951).

Results. --(1) More than 80 percent of the total N of the muscle non-protein nitrogen has been accounted for as 42 percent α-amino N, 13 percent trimethylamine oxide N, 12 percent glycine betaine N, 2 percent volatile base N, 11 percent nitrogen atoms other than α-amino in the α-amino acids, and 4 percent taurine N. (2) The water-soluble non-protein nitrogen of the hepatopancreas was partially accounted for at 38 percent α-amino N, 3 percent trimethylamine oxide N, 14 percent glycine betaine N, and 5 percent volatile base N. (3) The non-protein α-amino N in muscle and in hepatopancreas ranges between 200 and 400 mg. per 100 grams wet tissue; in blood the value is less than 10 mg. per 100 ml. Fifteen free amino acids have been detected in the muscle, seven in the hepatopancreas, and six in the blood. Free glycine is present in relatively large amounts in all three tissues as is proline in muscle and taurine in hepatopancreas. (4) The reducing substance of lobster blood which has been demonstrated chromatographically to be glucose, is equivalent to 20 mg. of glucose per 100 ml. of substance. (5) Changes occurred in water-soluble non-protein N of lobster muscle and hepatopancreas during incubation at 30° C.

1.01 (Cross Reference: 9.2)

Section 4 -- Historical summaries. --As an aid to research workers, this Section brings together available data on fish landings for the 44 years 1910-53, arranged in six tables, one for each continent, and two for the whale catch.

1.10 (Cross Reference: 1.0117)

1.9 NUTRITIVE VALUE OF THE PALOLO

Miller, Carey D.; Pen, Florence; and Gatty, Harold (Department of Foods and Nutrition, University of Hawaii Agricultural Experiment Station, Honolulu, T. H.)
Federation Proceedings 14, Part 1, 445 (March 1955)

The palolo (Eunice virdis), an annelid worm, rises to the surface of the ocean from the coral reefs of Samoa, Fiji and some other tropical Pacific islands from October to December. The natives have for generations been able to predict the time of its rise, but scientific observations have enabled one of us (H. G.) to make even more accurate predictions. It is estimated that the quantity of palolo during the 2-3-day rise amounts to thousands of tons. The natives consider it a great delicacy, gather as much as they can, and send it inland by runner as prized gifts to chiefs and friends. It is eaten in the raw and the cooked states. Though the periodicity of its rise has interested scientists for years, to our knowledge no one has investigated its nutritive value. Palolo collected by H. Gatty was refrigerated at once, quick frozen after 24 hours., and shipped in the frozen state in a thermos jug by air from Fiji to Honolulu. Analyses showed the raw palolo to have the following composition/100 gm: 76.2 gm water; 15.1 gm protein; 4.9 gm fat; 2.4 gm ash; 36.6 mg calcium; 310.0 mg phosphorus; 2.9 mg iron; 514 i.u. vitamin A; 1350 μg carotene; 0.07 mg thiamine; 0.59 mg riboflavin, and 1.32 mg niacin.

ABSTRACTER: Reprinted in whole

2.00 THE SCIENTIFIC FOUNDATION OF SANITARY CONTROL OF FROZEN AND CURED FISH PRODUCTS

Rieman, Hans (Technological Laboratory, Ministry of Fisheries, Copenhagen, Denmark)
Symposium on cured and frozen fish technology, Swedish Institute for Food Research, Göteborg, No. 100, Chapter 16, pp. 1-5 (November 1953)

Chilled fish as a cause of food poisoning. --Few outbreaks of food poisoning have been traced to chilled fish, due probably to: (1) no human pathogenic bacteria is known which will produce disease in fish or multiply in the tissues of living fish; (2) most pathogenic bacteria do not survive long in seawater; and (3) fresh fish is nearly always kept at a low temperature, in which case it is probable that the psychrophilic bacteria naturally present will spoil the fish before the mesophilic food-poisoning bacteria will have multiplied to an extent which makes them dangerous. All measures should be taken to provide good housekeeping where fish is stored and handled. When the fish is cooked, a slightly different situation exists. If the cooling is too slow, the mesophilic food-poisoning bacteria may multiply; therefore, cooked fish must be cooled rapidly.

Effect of freezing on bacteria. --It may be concluded from the facts known about the effect of freezing on bacteria that commercial freezing will destroy most of the bacteria present in the foodstuff and arrest the development of the rest indefinitely. Freezing will not destroy preformed toxins of C. botulinum or Staph. aureus. When the food is defrosted, a sufficient number of living bacteria will remain to restart decomposition, among which may be important food-poisoning types.

Sanitary control with frozen fish. --Very few cases of food poisoning have been traced to frozen fish and fillets. From a sanitary point of view, the frozen product is preferable to the fresh because bacteria are killed during freezing. Furthermore, frozen fish and fillets are mostly prepacked which excludes risks of recontamination.

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ABSTRACTER: S. R. Pottinger

2.19 PRESERVATION OF FISH IN TRAWLER HOLDS. I THE EFFECT OF THE DISTRIBUTION OF ICE ON THE KEEPING TIME OF FISH

Castell, C. H. and MacCallum, W. A. (Atlantic Fisheries Experimental Station, Halifax, Nova Scotia)
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations No. 59, 15-18 (August 1954)

Proper icing is the most important single factor in retarding the spoilage of iced fish in boats at sea. Proper icing can be defined as (1) sufficient ice for cooling a given weight of fish, (2) an abundance of ice where necessary to keep the fish from pressing against the surface of pen walls and pen boards (wood surfaces in particular), and (3) intimate mixing of the ice and the fish instead of adherence to the practice of using thick layers of fish separated by less thick layers of ice.

Layering of fish and ice in the hold is an undesirable practice for two reasons: (1) fish in deep layers do not cool as rapidly as fish in thin layers or fish almost completely surrounded by ice, (2) fish in deep layers do not allow for adequate drainage of ice water and fish drip especially in the bottom layers of the pen. Fish that are mixed with the ice when they are placed in the hold, cool down to 32° F. more rapidly and afford better drainage of water through the fish. As a result, the growth of spoilage bacteria is retarded and fresh quality is retained.

The importance of mixing the ice with the fish has been demonstrated many times. The following experiment is another example: One-day-old whole gutted scrod haddock that had flesh with an average trimethylamine value of 0.12 mg./100 g. and an average pH of 6.5 (very fresh) were divided into two lots and iced down in specially constructed small fish pens. The fish in lot one and pen one were buried individually in ice and surrounded with 12 inches of ice at the bottom, top, and sides of the pen, whereas the fish in lot two and pen two were piled 14-inches thick in a layer surrounded with 12 inches

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ABSTRACTER: Martin Heerdt

2.01 SPOILAGE PROBLEMS IN FRESH FISH PRODUCTION. III BACTERIOLOGICAL PROBLEMS IN THE HANDLING OF ROUND FISH AT SEA

Castell, C. H. (Atlantic Fisheries Experimental Station, Halifax, Nova Scotia)
Research Board of Canada Bulletin No. 100, 7-15 (1954)

The mechanism of spoilage. --The muscle of freshly killed fish is usually sterile. If the fish are kept near ice temperature, bacterial penetration through the skin and into the muscle will not occur for at least 7 to 10 days. As the fish are gutted, bacteria from the slime and the intestines are spread throughout the belly cavity. If large numbers of bacteria are present in the surface slime and in the gut cavity, they not only start growing, but they begin producing the enzymes that gradually decompose the slime and the membranes of the gut cavity. Some of the soluble bad-flavored substances resulting from this surface spoilage will gradually diffuse right into the muscle itself, and some of the normal soluble constituents of the muscle will diffuse from the sterile muscle out to the surface where the bacteria can act on them.

Reducing the initial contamination. --A fish as it is pulled out of the water, may have anywhere from 100 to 50,000 bacteria per square inch on its surface. As the fish are piled up on the deck the contents of their intestines get pressed out and spread over the fish. This adds thousands of additional bacteria per square inch. During washing and gutting many of these bacteria are carried into the gut cavity. If conditions are right, the bacteria that are present on the fish begin to grow and multiply. Soon there are tens of millions of bacteria in place of tens of thousands. To prevent the initial spoilage of the fish at sea, the fisherman must: (1) try to limit the number of bacteria that are on the round fish at the time it is iced down in the hold, and (2) retard the rapid multiplication that may take place during transit.

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ABSTRACTER: Martin Heerdt

2.19

of ice at the bottom, top, and sides of the pen. Temperatures in several fish in each lot were taken and recorded automatically throughout the storage period. The fish were reiced as needed.

After being stored 7 days in ice some of the fish from each lot were removed and examined both whole and as fillets cut from the whole gutted fish with the following results: Whole gutted fish buried in ice in pen one and fillets cut from these fish were fresh and without odor. Whole gutted fish layered in ice but taken from the top of pen two and fillets cut from these fish were fresh and without odor but somewhat slimy. Whole gutted fish layered in ice but taken from the bottom of pen two were slimy and had offensive odors. Fillets cut from fish from the bottom of pen two were slightly smelly and slightly soft. In conclusion, pen two produced a mixture of good and spoiled fish, whereas pen one produced only good fish.

After being stored 9 days in ice the fish in pen one had slight spoilage odors in their visceral cavities and fillets cut from these fish had an initial spoilage odor. The fish at the top of pen two were similar to the fish in pen one, however, a few were smelly. The fish at the bottom of pen two were putrid or fecal and three out of five fillets cut from these fish were inedible.

After being stored 7 days in ice the worst fish at the bottom of pen two were better than the average fish that had been seven days in ice aboard a vessel. The reason for their better quality is the quantity of ice that was used to surround them.

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Care in handling fish on the deck. --It is most important not to leave the fish exposed on the deck where the temperature of the fish can rise from that of the sea water to atmospheric temperature or above. Three hours or more in the warm summer sun or six to eight hours in the early spring sun will cause a noticeable deterioration in the fish when they are landed. If the fish are gutted, the visceral organs should be completely removed, otherwise they will provide an ideal breeding place for bacteria.

Problems related to ice and its use in the hold. --Dirty ice in which the fish lies buried for days at a time may easily contaminate the fish. If the ice is thoroughly washed before it is crushed, most of these organisms are eliminated. Artificial ice is usually free from trouble; however, ice that is held in uncleaned fish pens may also become a source of contamination. If deep layers of fish and ice are stowed without being separated by shelves, the fish at the bottom are often bruised or punctured by the ice.

The cold-loving bacteria. --Bacteria that come with the fish from the sea grow normally at refrigerator temperatures of 35° F. to 40° F. and slowly at 32° F. To retard the growth of these cold-loving bacteria, the temperature must be reduced below that of the sea from which they come. Every decrease of one or two degrees between 40° F. and 32° F. helps to further retard the multiplication of these particular bacteria. Using market cod that had been iced for 24 hours, the number of days that elapsed before the first spoilage odors became noticeable was 8 days at 32° F., 5 days at 37° F., 3 1/2 days at 41° F., and 1 1/2 days at 50° F.

Preservative dips and ice for fish at sea. --Disinfectants have been used on round fish but none has been found to be effective because the bacteria are protected by the fish slime in which they are imbedded. The difficulty in adding a disinfectant to the ice used for cooling the fish is in getting an even distribution of the disinfectant in the ice.

1.9 (Cross Reference: 2.9)

2.00 (Cross Reference: 2.05)

The action of salt upon bacteria. --Very little really quantitative information exists with respect to the fate of pathogenic and food-poisoning microorganisms in salted fish products. It may be concluded from available information that salting cannot be relied upon as a means of freeing food from dangerous bacteria or bacterial toxins but that the amount of salt ordinarily used for non-acid foods (greater than 10 percent salt) inhibits the development of such bacteria and their toxins quite effectively.

Sanitary control with salted fish and fish products. --Salting is in some respects similar to freezing, in that both preservation methods stop the development of dangerous bacteria if they are properly performed. When preparing the foodstuffs for use by defrosting or desalting, any dangerous bacteria present may have a chance to grow if the products are kept at too high a temperature for too long a time. The few reported cases of food poisoning from commercially salted and frozen fish products seem to indicate that these products at present are rather safe. The reported cases of botulism from home-salted fish products are due to the consumer's lack of knowledge about the amount of salt required for safe preservation.

2.01 THE BACTERIOLOGY OF DEHYDRATED FISH. II. OBSERVATIONS AND EXPERIMENTS MADE DURING SMALL-SCALE COMMERCIAL PRODUCTION

Shewan, J. M.
J. Hyg., Camb., 52, 247-252 (1954)
Food Science Abstracts 27, 133 (March 1955)

Counts of viable bacteria on dehydrated fish (herring, kippers, fresh and smoked cod), produced on a small scale commercially during the summer of 1944, gave figures ranging from near sterility to over 170,000 per g., about half the samples exceeding the arbitrary limit of 10,000 per g. provisionally fixed for a first-class product. The next year, slight alterations were made in the technique of drying, and the counts were uniformly low, never exceeding 2,400 per g. In 1944 about 12 percent of colonies isolated from blood-agar and alkaline-agar plates were coagulase-positive micrococci; none of these were found in 1945. Bacteriological analysis showed that during the processes of mincing the fish, and spreading it on trays after cooking, the counts could increase almost up to the values on the original raw fish. The main danger of infection by food-poisoning bacteria, particularly staphylococci, almost certainly occurs at this stage. Recommendations are made for precautions to be taken in the commercial production of dehydrated fish.

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2.12 USE OF UNDERWATER TELEVISION IN FISHING-GEAR RESEARCH (PRELIMINARY REPORT)

Sand, Reider F. (U.S. Fish and Wildlife Service, Coral Gables, Florida)
Commercial Fisheries Review 17, 1-5 (April 1955)

Direct observation of a midwater trawl net in operation was a joint field project conducted by the U. S. Fish and Wildlife Service and the U. S. Navy's Bureau of Ships in November 1954. This was the first practical demonstration in this country of the application of underwater television (TV) as a research tool for experimental work in fishery methods and equipment. Over a period of two years many preliminary experiments were made to prepare the TV chain for this initial demonstration. Many mechanical and technical modifications were necessary to utilize the maximum picture potential.

A separate generating set was installed aboard the Service's research Pompano to provide an adequate 110 volt a.c. power supply for the TV chain. In addition to the sync-pulse generator built into the chain, an auxiliary unit was often necessary to stabilize picture quality under field conditions. The TV camera was housed in a watertight steel cylinder and connected by a flexible multiconductor cable to a remote control monitor aboard the research vessel. By mounting the camera in a fixed position on a submersible sled with properly set vertical and horizontal stabilizers, a towed object might be viewed from the front, the top, or laterally at different angles. Good viewing was obtained at depths in excess of 60 feet and at distances of more than 60 feet.

Considerations of the critical angle of sunlight and various surface conditions were made. In the clear waters such as those of the Gulf Stream off the coast of Florida, where the experiments were conducted, as much as 50 percent natural sunlight could be expected at depths to 25 feet. A period from 9:00 in the morning to 3:00 in the afternoon, with favorable atmospheric and hydroscopic

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ABSTRACTER: Harold C. Johnson

2.118 FREEZING FISH AT SEA -- NEW ENGLAND PART 10 - STUDIES OF MISCELLANEOUS HANDLING PROBLEMS

Magnusson, Harris W.
Commercial Fisheries Review 17, 9-16 (July 1955)

The refrigeration equipment aboard the Delaware does not interfere with the normal handling of the fishing nets. From the time the fish are on the deck, however, the procedures employed on the Delaware differ from those employed on a commercial trawler. Certain handling problems are peculiar to (1) freezing fish at sea, (2) storing frozen fish on a vessel, (3) storing these fish ashore, (4) thawing frozen fish, and (5) cutting the thawed fish and packaging the fillets.

Freezing operations. --The freezing system is described by Oldershaw in Part 9 of this series. The rate at which this system can handle fish is limited by the following factors:

(1) The rate at which the fishermen can load and unload the baskets.
(2) The minimum time required before the fish are completely frozen.
(3) The maximum sustained rate at which fish can be added without warming the brine above the prescribed operating temperatures.
(4) The maximum weight of fish that can be added in a short interval of time without unduly warming the brine.
(5) The maximum weight of fish that can be held in the system at one time.

Storage of fish on the vessel. --With the present arrangement, the Delaware has a maximum of 3,800 cubic feet of cold storage space. When simply dropped into the storage spaces, the average density of fish is at least 30 pounds per cubic foot. By arranging the fish in the hold the density can be increased to 33 pounds per cubic foot. No one need work in the refrigerated holds until they are

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ABSTRACTER: Kathryn L. Osterhaug

2.14 EXPLORATORY EXPERIMENTS IN GUIDING SALMON FINGERLINGS BY A NARROW D.C. ELECTRIC FIELD

Trefethen, Parker S. (Fishery Research Biologist, U. S. Fish and Wildlife Service)
Special Scientific Report: Fisheries No. 158 (June 1955)

The effectiveness of one type of narrow direct-current electrical field in diverting salmon fingerlings in flowing water was explored experimentally in relation to (1) the angle of the electrical field relative to the direction of water flow, (2) the width of the electrical field (distance between rows of electrodes), (3) the spacing between electrodes, and (4) the diameter of the electrodes. The electrical conditions were held constant at a voltage gradient of 1 volt/cm., a pulse frequency of 8 pulses/sec., and a pulse duration of 40 milliseconds with a square wave form.

It was determined that under the conditions of these experiements the maximum effectiveness occurred at a 40° angle of electrical field and a two-foot width of electrical field with 1/2-inch electrodes spaced 12 inches apart. With a few exceptions, the 40° angle of field was not significantly more effective than the 60° angle of field, and the 1/2-inch diameter electrode was not significantly more effective than the 2-inch diameter electrodes. The 2-foot width of field appeared to be more effective than the 3-foot width of field. The results of variation in electrode spacing were greatest at a 40° angle of electrical field.

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ABSTRACTER: Parker S. Trefethen

BACTERIOLOGY OF DEHYDRATED FISH

FREEZING FISH AT SEA

UNDERWATER TV

GUIDING BY AN ELECTRICAL FIELD

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about two-thirds full. Occasionally, as the last third is accumulated, one or two men must arrange the frozen fish to assure capacity loading.

The problems of unloading the frozen fish from the holds are, (1) that the canvas baskets used for unloading have capacities only about half as great for frozen fish as they do for regular iced fish, (2) the crew members have a natural aversion to working for extended periods in the refrigerated holds, and (3) there is some danger of the hard frozen fish falling back into the holds. For their protection the men in the holds wear hard-top hats of the type worn by construction workers. The solution to unloading problems may be a continuous conveyor lowered to the level of the fish.

Storage of fish ashore. --About 70 percent of the frozen fish delivered by the Delaware has gone directly into a cold storage warehouse. The most satisfactory method of handling has been found to be in specially constructed boxes 3 x 37 x 23 inches inside dimensions, capable of holding about 410 pounds of frozen fish. They fit one of the common size wooden pallets and when properly stacked make efficient use of the full height of the storage rooms.

Thawing operations. --On the basis of past investigations and reports it is recommended that the frozen fish be thawed by immersion in well circulated fresh water at about 60° F. Thawing time for most fish at this temperature is between one and one-half and three and one-half hours. For ease in handling it has been found desirable to remove the fish from the water when thawing is only 80 to 90 percent complete.

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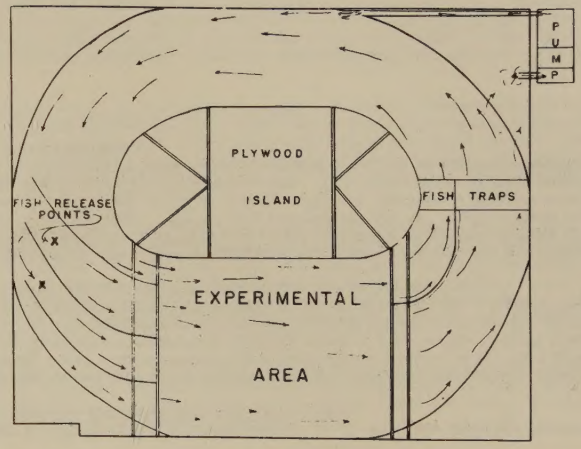

Fig. 1. A plan view of concrete tank in which experiments were conducted.

2.01 (Cross Reference: 3.6)

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conditions, was found to be the optimum for work with the vidicon TV system. At depths in excess of 30 to 40 feet, where color tends to shades of blue and green, white or yellow indicated the greatest persistance for visual observation of the fishing gear. As the camera submerged, lens coverage reduced about 25 percent, due to the refraction of light. The use of a wide-angle lens afforded greater facility in viewing, with a minimum blurring of image, in most instances over limited distances.

As a result of these experiments, it is indicated that underwater TV chain can successfully be utilized as a means of observing fishing gear in operation and as an aid to investigations in marine biology and in limnology. While image orthican TV equipment is certainly desirable from the standpoint of greater sensitivity and definition, it remains a comparatively complex instrument. The picture quality of vidicon TV equipment is somewhat less in comparison but should prove adequate for conditions of limited receiving distances wherever favorable illumination is provided.

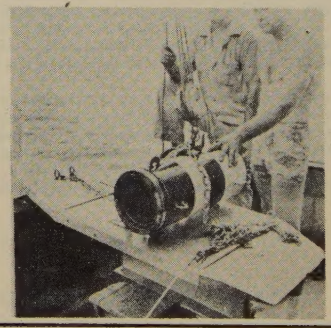

Fig. 3. Early experimental mounting of TV housing on submersible sled. Camera set for side viewing.

2.03 THE FRESHNESS OF FISH AND THE AMOUNT OF HISTAMINE PRESENT IN MEAT. IV.

Kimata, Masao; Kawai, Akira; and Tanaka, Mikio (Kyoto University, Kyoto, Japan)
Mem. Research Inst. Food Sci., Kyoto Univ. No. 8, 1-6 (1954)
Chemical Abstracts 49, 7146 (1955)

The modes of changes of the amounts of various amines produced in the meat of mollusca such as squid (Loligo japonica) and the octopus (Polypus vulgaris) were studied after the meats were spoiled by bacteria. During the progress of spoilage, histidine in the free state was not found irrespective of the degree of freshness. The amounts of amino and ammonium N in the meats increased with the progress of spoilage and the increases were faster at higher temperatures. Histamine was produced after the production of amino and ammonium N started. It is generally produced in very small amounts, and it appears to be derived from histidine liberated by the bacterial decomposition of muscle protein. It is suggested that the poisoning by meats of octopus or squid of low freshness is not caused by histamine. It is indicated that if histamine alone is produced as the poisonous substance in the early stage of spoilage, the degree of freshness estimated by the determination of the amount of ammonia in the meats is not unreliable for sanitary purpose.

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2.118 FREEZING FISH AT SEA -- NEW ENGLAND . PART 9 - IMPROVEMENTS IN THE BRINE-FREEZING MECHANISM ON THE TRAWLER DELAWARE

Oldershaw, C. G. P.
Commercial Fisheries Review 17, 1-8 (July 1955)

One of the principal objectives of the Fish and Wildlife Service's freezing-fish-at-sea project is to develop equipment for handling, freezing, and storing fish that can be readily installed on existing New England trawlers. The principal advantages of freezing fish at sea are the following: (a) catching fish on more distant grounds; (b) landing fish of high and uniform quality; (c) landing capacity loads; (d) leveling out supplies of raw material for the processing plant through frozen storage.

The original experimental freezer on the Delaware has been replaced with an improved model of new design. The following were considered necessary features to be incorporated into the design of a new freezer: (a) permit loading and unloading from either side of the deck (Fish unloaded from the freezer could then be dropped into the cold-storage hold through adjacent hatches.); (b) have capacity to handle anticipated normal catches, plus an appreciable overload; (c) occupy the least possible deck space and in no way interfere with normal operation of deck gear; (d) agitate the fish sufficiently to prevent their sticking together and to promote rapid freezing; (e) provide for draining excess brine from the fish before they are discharged into the hold; (f) be simple in design, rugged, and easy to repair; (g) provide for continuous straining of the brine, with easy access to the strainer for cleaning on deck.

The freezer chosen for installation aboard the Delaware consists of a deep rectangular brine tank, extending above deck, in which the fish are carried through the brine in large cylindrical baskets mounted on an endless chain conveyor. The freezing mechanism is simply a vertical endless-chain conveyor, that continuously circulates the baskets of fish down through the brine and then up to a convenient working height. The conveyor may be stopped at any point in order to hold any particular

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ABSTRACTER: Kathryn L. Osterhaug

2.14 THE KANNIZZATI FISHERY OF MALTA

Burdon, T. W.
World Fishing 4, 20 (July 1955)

The fishermen of Malta catch approximately 40 percent of their fish from the "kannizzati" fishery, a resource that is largely neglected in other places. Dolphin and pilot fish make up most of the catch. They are found in the waters around Malta from August to December and have a habit of collecting around any floating object in the open sea.

A line of floats is set on a fixed bearing running out from the coast up to 60 fathoms deep and for a distance of up to more than 80 miles from land in some places. The Department of Fisheries controls the regulations governing minimum distance between floats and each licensee has to lay at least twenty floats.

Slabs of cork are preferred for the individual floats and each float is attached to a light sisal cord anchored by means of a heavy stone weight. The stone is thrown overboard when the floats are set, and the line is allowed to run out until it reaches the bottom, additional coils being added when necessary. The floats, which are set at the beginning of the season, are made up of two pieces to prevent the line from untwisting in heavy weather. A terminal marker flag is also attached. When the fish appear they are caught with a "kannizzati" net, a true lampara, the size of which varies with the size of the boat used. The largest are about 150 fathoms in length and 13 fathoms deep in the center tapering to one fathom at each end of the wings. Five or six men work from the "luzzi", an open boat, which is the typical fishing boat of Malta, but a crew of ten or more work on the large nets which are used on the 70-foot launches.

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ABSTRACTER: Mabel A. Edwards

2.43 A BOLSTER FOR THE LOBSTER

Anonymous
Modern Refrigeration 58, 291 (August 1955)

A British shellfish distributor is using polyethylene "bolsters" of ice to refrigerate live lobster and crab for shipment to the European continent. This method of refrigeration helps to insure that the shellfish reach their markets dry and in good condition.

The polyethylene comes in the form of lay-flat tubing that is cut to the required length, heat-sealed at one end, filled with water and then completely heat-sealed. The resulting bags of water are frozen for later use.

When the shellfish are being packed for export, a layer of "ice bags" is placed in the carton and the lobsters and crabs placed on this in a padding of wood wool.

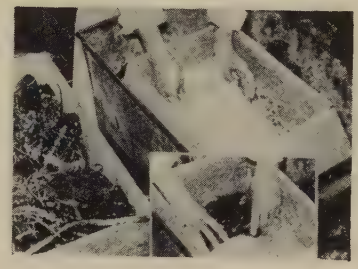
In addition to improving the keeping qualities of the shellfish, this method helps preserve the cardboard shipping cartons that formerly lost shipping strength through dampness from the unprotected melting ice.

ABSTRACTER: Kathryn L. Osterhaug

2.14 (Cross Reference: 1.049)

When the boat comes close to the fishing grounds the net is flaked down at the stern end with each wing and the central bunt separate. When the fish are present the boat circles the area slowly, a small float attached to the wing being trailed in the water behind. When the skipper gives the order this is released and the net runs out as the boat increases its speed to circle the float as quickly as possible. The circle decreases as the net is hauled and the boat is reversed towards the float. The wings are brought together on the starboard side, and except for a narrow slit through which the float is passed, the bottom is now closed. The footrope is brought on board and the fish are trapped in a saucer of netting. If the catch is small the bunt is hauled into the boat, otherwise, the fish is brailed from the net. To prevent damage to the fish they are suffocated in a sack, washed in sea water and packed in boxes with ice. The fish is well liked and the prices are good.

2.43 (Cross References: 1.87, 1.86)



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basket in position for loading or discharging fish.

Each of the eleven freezer baskets will hold 500 pounds of round fish giving the machine a total capacity of 5,500 pounds.

The frozen-fish storage capacity on the Delaware is estimated at 200,000 pounds.

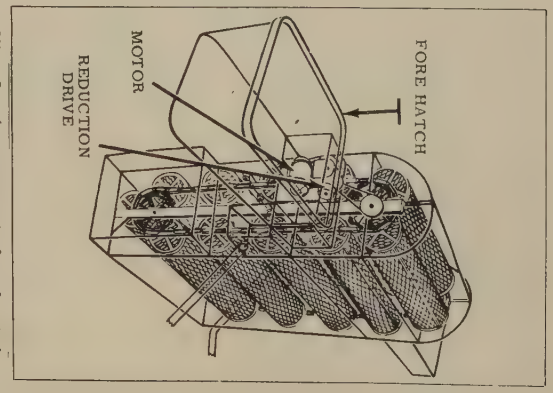

Fig. 2. Arrangement of perforated containers of freezing mechanism.

2.6 RESEARCH IN ECONOMICS UNDER THE SALTONSTALL-KENNEDY ACT

Kahn, Richard A. (Branch of Commercial Fisheries, Fish and Wildlife Service, Washington, D. C.)
Southern Fisherman 15, 18-19 (August 1955)

Several studies in the field of economics have become possible through funds provided by the Saltonstall-Kennedy Act.

Survey of public eating places. --The Bureau of the Census is to undertake a survey of fish consumption in public eating places with the following objectives:

(1) To determine the form and type in which each species is purchased by the public eating places; e.g., fresh, frozen, filleted, canned or cured.

(2) To ascertain the factors which influence the use or non-use of the various forms or types of fish and shellfish by public eating places.

(3) To determine the source of supply of fishery products, sizes of unit, prices and other characteristics of purchases.

(4) To obtain opinions as to preferences of respondents regarding quality of fishery products purchased, methods of cooking, methods of serving, prices of servings, size of portions, and comparative prices of fish and non-fish meals.

Institutional study. --A smaller survey is being undertaken to determine how "in-plant" feeding institutions, which include schools, hospitals, factories, corrective institutions and business house cafeterias, may make intensive purchase of fish and shellfish.

The aim is to keep these studies on a continuous basis and examine any change in the patterns of consumption and marketing due to variations in tastes and eating habits.

Survey of shrimp industry. --Special attention has recently been given to segments of the fishing industry suffering from economically adverse conditions. The shrimp industry is one which is now receiving attention. A drastic drop in shrimp prices occurred in 1953 causing a near catastrophe in

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ABSTRACTER: Kathryn L. Osterhaug

3.12 THE WINTER SEASON AT TJAERE BAY, 1953. I. THE KEEPING QUALITY OF RAW MATERIAL DURING STORAGE

Arefjord, M.; Astrup, H.; and Sand, G.
Meld. S.S.F., No. 3, 56-58 (1953)
Food Science Abstracts 27, 135 (March 1955)

Results are given of storage experiments in which large herring were stored as follows: (1) from February 4th, at 0° C., for 37 days, (2) from February 24th, at 5° C. to 6° C., for 32 days, and (3) from March 2nd, at 6° C. to 7° C., for 21 days, and also (4) with herring received on March 19th, at 6° C. to 7° C., for 21 days. Preservatives used, in various concentrations, were formalin, sodium nitrite, Foromycen, or salt. Each storage container held 4,000 to 5,000 l. of fish; there was good drainage in 32 of the 33 tests. The degree of freshness of the fish was estimated from the values for free fatty acids in the expressed oil and from the contents of volatile nitrogen (trimethylamine and ammonia) in the flesh; the color of the oil was evaluated with Lovibond's tintometer. Good results were obtained by storing the herring with addition of either 0.1 percent of sodium nitrite or a mixture of 0.03 percent to 0.05 percent of nitrite and 0.1 percent of formalin. Formalin alone (0.1 percent to 0.2 percent) was unsatisfactory. The use of Foromycen has not so far been effective.

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3.19 PRESENT STATUS OF FISH PROCESSING BY ELECTRONIC IRRADIATION AT THE MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Nickerson, John T. R. and Proctor, Bernard E. (Contribution No. 181 for The Department of Food Technology, Massachusetts Institute of Technology, Cambridge, Massachusetts)
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 18, pp. 1-12 (November 1953)

Ionizing radiations may be used to destroy all microorganisms in foods; however, certain difficulties must be overcome before such applications can be considered successful. Psychrophilic bacteria are destroyed with lower doses of ionizing radiations than are spore-forming bacteria. Enzymes in pure solutions are readily destroyed by ionizing radiations but are less affected in natural foods. Autolytic enzymes in mackerel fillets undergo a decrease in activity of approximately 20 percent when irradiated with doses of high-voltage cathode rays of 1.5×10^6 rep. Vitamins act as typical chemical compounds when exposed to ionizing radiations being more readily destroyed in pure dilute solutions, and at temperatures above freezing. Vitamins vary in their relative radio-sensitiveness, niacin being the most resistant and ascorbic acid the least. Foods treated with ionizing radiations undergo undesirable flavor changes. Ascorbic acid and its analogs and monosodium fumarate will sometimes act as free-radical acceptors to prevent flavor changes.

Haddock fillets, irradiated at levels sufficient to destroy psychrophilic organisms and then stored at 36° to 40° F., showed viable bacteria counts only slightly higher than the number in the frozen control. Flavor changes were noted in the fillets. Irradiated fillets treated with free-radical acceptors (sodium ascorbate and monosodium fumarate) were more acceptable than the untreated irradiated fillets.

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ABSTRACTER: Frank Piskur

3.230 THE QUICK-FREEZING OF FISH DISCUSSED BY FOURTEEN COUNTRIES

McCabe, E. W.
Modern Refrigeration 58, 231,-234 (July 1955)

"Sixty delegates from fourteen countries--Austria, Belgium, Canada, Denmark, France, West Germany, Great Britain, Greece, Holland, Iceland, Ireland, Italy, Norway, and Sweden--recently attended a "workshop" arranged by the Office of European Economic Cooperation in Kiel, Germany. Its object was the pooling of technical and commercial knowledge which has been gained up to the present in the technique of improving quality and packing of quick-frozen fish which so greatly affects the fishing industry of all Europe."

A well-planned program of practical and theoretical study was arranged for the five days, with six papers being read and visits being made to various processing stations and cold stores in both Germany and Denmark.

In the discussions, the necessity was noted for a complete "cold chain of marketing" to insure that fish reach the consumer in first-class condition. It was agreed that deep-freezing of fish is essential in order to secure more uniform marketing and more even and wider distribution. The need was seen for the freezing of the fish as soon as possible either on board the vessel or on land depending on circumstances. Some fishing areas are in proximity to the processing plants, and with favorable sea and atmospheric conditions throughout the year, processing and freezing at sea is an unnecessary expense. For other areas, much experimentation in freezing at sea is being undertaken. In Kiel, Germany, delegates visited a prototype trawler under construction which will be capable of quick-freezing 20 tons of fillets and 10 tons of whole fish per day.

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ABSTRACTER: Alan S. Beggs

RESEARCH IN ECONOMICS

RADIATION PRESERVATION

PRESERVATIVES FOR FRESH HERRING

FISH FREEZING CONFERENCE

3.19

Extended toxicological studies must be completed before the method of treating food products with ionizing radiations can be approved. The future application as a method of food processing also depends upon such economic considerations as cost of equipment, maintenance costs, and production rates.

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The need for control of humidity in the quick-freezing and storage of fish and other foodstuffs was reported, with the ideal of 100 percent saturation expressed as desirable. Warning was given against the practice of brining as being dangerous to flavor, and details were offered of the Norwegian method of treating the fish with alginates, ascorbic acid, and N. D. G. A. for control of rancidity.

A simple test for the freshness of fish was proposed, which is to excite the lens of the eyes of fish, matching their opacity with standard opaque beads. The longer the fish have been on ice, the more opaque are the lenses. By this method, the length of icing can be estimated to within a day and a half.

The importance of proper handling of the fish between the time of being caught and later consumed was stressed throughout the conference. The two enemies of palatable frozen fish, dessication and oxidation, need to be defeated by packaging and by scientifically controlled conditions, particularly in regard to the humidity percentage.

2.6 (Cross References: 1.85, 9.2)

that industry. After the Saltonstall-Kennedy Act was passed in 1954, the Economics and Cooperative Marketing Section developed a plan for immediate assistance to the industry. In order to carry out the survey on many fronts at once, five contracts were let to assist in the work:

(1) The first is a study of vessel and plant operating costs over a period of more than 3 years.

(2) The second sub-contract is a study of the physical efficiency of shrimp vessels. This study has the following objectives: (1) To determine increase in vessel catch per man-hour and per vessel-hour with improved vessel operations.

(2) To determine the cost advantages of recent devices, such as the shrimp lupe, radar, ship-shore phone, depth finder, etc.

(3) To determine the most efficient method of heading, shelling, freezing and packing on board vessel.

(3) The third sub-contract is a study of the physical efficiency of processing plants with a view to possible improvements.

(4) A fourth research contract was given to the University of Miami to study the economics of production and primary marketing of domestic shrimp.

(5) The fifth and final contract contains the following two assignments to the contractor:

(1) A sample survey of secondary wholesalers and retailers is to be done to determine the availability of fresh, frozen uncooked breaded, cooked breaded, and canned shrimp in principal United States markets.

(2) A controlled merchandising experiment of factors involved at retail point-of-sales is to be conducted also to determine the principal merchandising factors which influence retail sales of fresh, frozen, uncooked breaded, cooked breaded, and canned shrimp.

In addition to the information obtained from the five sub-contractors, the shrimp study will contain reports on transportation rates and time and motion studies on shrimp vessels as well as an historical study of the development of the shrimp industry up to and including current catches, imports and exports.

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3.29 B-VITAMIN RETENTION IN FROZEN MEAT

Kotschevar, Lendal H. (Director, Residences and Food Services, Montana State University, Missoula, Montana)
Journal of the American Dietetic Association 31, 589-596 (June 1955)

Retention of thiamine, riboflavin and niacin in calves liver was determined at five stages; (1) raw, (2) after 48 hours at 0° to -5° F., (3) after 60 days freezer storage, (4) after thawing and (5) after cooking. Retention was studied to a lesser degree in beef, pork, and lamb by analysis prior to freezing and in drip after thawing.

Analytical procedure was that recommended by the Association of Vitamin Chemists, Inc. The digestion process was used and portions of the digest taken separately for the specific analysis. For thiamine, the thiochrome method was used; for riboflavin, the fluorometric method; and for niacin in experiment I, the colorimetric method and in experiment II, the microbiological technique.

The greatest vitamin loss occurred in raw liver during frozen storage and during thawing prior to cooking. Slightly more thiamine and riboflavin were retained in liver cooked from the frozen state than in liver cooked after thawing. Freezing pre-cooked liver slices for 60 days destroyed no more thiamine and riboflavin than freezing raw liver for 60 days and then cooking it.

The percentage drip obtained from liver, steaks, and some roasts indicated significant vitamin losses during thawing. Data indicated that cooking meat from frozen state would save nutrients. However, certain cooking problems are evident; i.e., heat adjustment necessary to avoid overcooking exterior before the interior is cooked. Author suggested that partially thawed meat, as indicated by disappearance of ice crystals and the beginning of drip, in small cuts, and, in larger cuts, meat

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 ABSTRACTER: Thelma Rose

3.33 STUDY OF GALICIAN CANNED FOODS. II. COVERING OIL AND ETHER EXTRACT OF CANNED FISH

Capont, F. L. and Costas, F. Bordallo
An. Bromatol. 4, 227-237 (1952) (Summary in English 227)
Food Science Abstracts 27, 134 (March 1955)

Physical and chemical characteristics of the olive oil used for covering canned sardines, white tunny flesh, and other products were investigated; the canned foods had been stored for periods ranging from 25 days to 9 months. In cans of molluscs examined, there was little, if any, change in the characteristics of the added oil. Data are tabulated for: the proportions of oil and fish in the cans, the contents of moisture and fat in the fish and of moisture in the fat; acidity (expressed as oleic acid), density, iodine number, refractive index, unsaponifiable matter, and polybromide reaction of the covering oil; and density, iodine number, and refractive index of the ether extract of the canned fish. There was no direct relation between the acidity of the covering oil and the quality of the canned product. The average moisture and fat contents of the canned fish were 70 and 67 percent, respectively. The polybromide reaction was positive in all the covering oils examined. Before the oil is added, its sulphur content should be determined. Winterization tests and other means of ensuring a canned product of good appearance and low water content are also dealt with.

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3.33 HEAT PENETRATION INTO CANNED FOODS

Charlett, S. M.
Food Manufacture 30, 229-232 (June 1955)

Heat processing of canned foods with steam under pressure is still the most widely used method of preservation. To formulate and evaluate processing times and temperatures it is necessary to measure the rate of heat penetration into the slowest-heating portion of the can being processed.

Prescott and Underwood (1897, 1898) made the first serious attempt to measure the rate at which heat from the processing medium penetrated into the center of the can, by using maximum thermometers sealed into cans which were heated in boiling water. Bitting and Bitting (1917) were the first investigators to measure temperature with thermocouples sealed into the can before they were processed under steam pressure. Thompson (1919) gave the first detailed description of an apparatus and the results obtained with it when used for the measurement of heat penetration into cans. Thompson also developed what have proven to be some of the most fundamental equations describing heat penetration into cans during processing. Improvements in the design of thermocouples, new methods of sealing couples into cans, and modifications in the design of meters for the taking of readings were made by Ford and Osborne (1927), Quiggle et. al. (1937), Benjamin (1938), Adam and Stanworth (1939), Trimble (1940), Heerdt et. al. (1947), Ecklund (1949), and Neilsen and Borson (1949). Rizika and Rohsenhow (1952) recently published work concerned with the thermal error of various thermocouples.

One of the earlier types of equipment produced in the U. S. A. consisted of a simple twisted copper-constantan couple which was fitted into the can by means of a large and cumbersome bushing. The leads from this couple were taken, via a cold junction, to a null indicating galvanometer calibrated

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 ABSTRACTER: Martin Heerdt

3.338 INTERNAL PROTECTION OF TIN-PLATE FOOD CONTAINERS

Davis, E. G. (Division of Food Preservation and Transport, C. S. I. R. O., Homebush, New South Wales)
Food Preservation Quarterly, 33, 33-35 (June 1955)

Canned foods may be broadly classified as "sulphur-staining" and "acid'staining" according to the effect on the container. The effect may be slight or so severe as to impair the value of the container. Methods of protection are different for each class of staining.

Sulphur staining occurs mostly with low-acid protein foods such as meat, fish, crustacea, and some vegetable products. This may be a light brown to a blue-black film adhering firmly to the tin plate. This discoloration is generally attributed to a breakdown of the proteins during processing which liberates sulphide ions. These ions react with the tin to form a tin sulphide. If the steel base is exposed, a black iron sulphide is formed. While these two sulphides are not a detriment to health, they do form an unsightly appearance on the can and even in the product.

Coatings may be divided into inorganic and organic protective films. Of the inorganic coatings "Protecta-tin" reduces sulphide staining effectively and is most adaptable to high speed application to the tin plate. "Protecta-tin Process" by (Kerr 1940; Lowinger and Kerr 1941) involves the use of trisodium phosphate, sodium chromate, sodium hydroxide, and a wetting agent such at Teepol or Disperol L.

Organic coatings have a wide use and function as chemically resistant barriers between the can and its contents. Organic coatings are usually applied to the sheet tin by roller coating and drying with high temperatures around 400° F. These lacquers are known as (S. R.) or sulphur resistant and as (A. R.) or acid-resistant coatings.

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 ABSTRACTER: Lynne G. McKee

3.33

to read directly in °F. Benjamin (1938) modified this couple by designing a couple detachable from the lead-in. Many workers made modifications and the ultimate result is a very compact and accurate apparatus that is manufactured in England.

An increasing amount of the work has been concerned with the various factors that affect the rate of heat penetration into cans. Thompson's work (1919) on the effect of can dimensions resulted in the formulation of some of the basic heat penetration equations. Bigelow et al. (1920) discussed the importance of the solidity of the pack, and can dimensions, in relation to heat penetration, and described a graphical method of evaluating data. Samson (1930) discussed the effect of the thermal diffusivity of the pack, whereas Wade and Benjamin (1948) expanded the consideration to include variation in filling weights, ratio of liquid to solid, and the vacuum inside the can. Wilbur (1949) investigated the effect of agitation on the rate of heat penetration, and the uniformity of heat distribution throughout a can. More recently McConnell (1952) and Evans and Board (1954) have shown the importance of variations in retorting procedures, and the effect of headspace variations upon heat penetration. Jones (1931) studied the time/temperature relationships in convection heating products, whereas Jackson (1940) studied the mechanisms of heat transfer within containers, this work being followed up by Jackson and Olson (1940) and Fagerson et. al. (1951).

Most of the theoretical work on processing has been based on the equations formulated by Williamson and Adams (1919) for the calculation of the temperature at the center of a finite cylinder at any time after the surface temperature is raised, and the later work of Thompson (1922) on heat flow in solids when the surface temperature varies. Ball (1928) used these equations for the calculation of and the theoretical formulation of processes. References cited: 154.

3.338

Four main types of lacquers are used for coatings in protecting tin plate containers: (1) vinyls, (2) phenolics, (3) oleo-resinous, and (4) epoxide types. With the exception of the vinyls each type can be given a wide range of properties by varying the chemical makeup.

Vinyls are free from taint and odor and have good chemical resistance but they will not stand high temperatures or adhere well to the plate. Phenolic lacquers have good chemical resistance and can be used where S.R. coatings are required. They are particularly good with some meat products but have the disadvantage that a phenolic taint may be given to the foods. The phenolic coatings are not flexible except in thin film weights. Oleo-resinous lacquers are the most widely used group. They have good chemical resistance, are low in cost, and easy to apply to the plate. Also, a wide range of material is available for their manufacture.

Epoxide lacquers are the latest addition to the list of lacquers available for tin plate coatings. Laboratory tests have shown that epoxide coatings are as good and in some cases better than the existing oleo-resinous coatings. Especially with citrus juices they show no tendency to strip or peel off as do the oleo-resinous types. The resistance to sulphur staining is very good and hence the epoxide coatings may eliminate the necessity for the can maker and packers to stock both A.R. and S.R. type coatings. Epoxide lacquers have the disadvantage that the baking temperature is critical and must be maintained within close limits. They also have a low solid content and two coatings must be applied to give the desired weight of film. Finally the cost is greater than most oleo-resinous lacquers used for coatings.

3.29

yielding slightly under pressure of fingers, might circumvent cooking problems.

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3.231 HUMIDIFICATION OF COLD STORES: THE JACKET SYSTEM

Lentz, C. P. (National Research Laboratories, Ottawa, Canada)
Canadian Journal of Technology 33, 265-278 (July 1955)

Principle of the jacket system. --Refrigerated air is circulated through a jacket or system of ducts entirely surrounding the room instead of being circulated around inside of the room. The vapor pressure difference between the product and the refrigerated surfaces, therefore, is not directly dependent on the external heat load or the operation of the refrigeration system. Temperature variations in the jacket, heat loads in the room, and uneven air flow distribution in the jacket all tend to lower the relative humidity in the room.

The test room. --A test room 10 x 10 x 20 feet long (figure 2, over) was constructed so that the results of the study could be used in the design of commercial cold storage rooms. An accurate room temperature was obtained by heating air of a constant ambient temperature to eliminate the effects of changes in refrigeration capacity before it entered the jacket.

Measurements. --Temperatures were measured with thermocouples. Relative humidity was measured by the wet-and-dry-bulb method. Velocity and static pressures were measured with a micromanometer and Pitot tube.

Findings. --Room relative humidity, which was found to vary with the rate and direction of air flow in the jacket, decreased from 98 percent, at a high rate of flow (1800 c.f.m.) to 89 percent at a low rate of flow (500 c.f.m.) in top-to-bottom circulation. In bottom-to-top circulation the decrease in relative humidity was gradual and did not exceed 2 percent, whereas in top-to-bottom circulation the relative humidity decrease was abrupt at velocities below 1200 c.f.m.

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 ABSTRACTER: Martin Heerdt

3.234 FREEZING FISH IN ALGINATE JELLY

Olsen, Ing. Alf. Dr. (A/S Protan, Drammen, Norway)
Food Manufacture 30, 267-270, 285 (July 1955)

Plank, Rudolf
Refrigerating Engineering 63, 57 (July 1955). Taken from "Protan--A New Method for Fish Freezing" by O. Helgerud. Kältetechnik 6, 190-193 (July 1954) (German)

Fatty fish such as mackerel and herring become rancid easily during frozen storage. This rancidity in frozen fish is caused by autoxidation and is influenced by the storage room temperature. Quality retention in frozen fatty fish, therefore, depends upon whether oxidation can be reduced or prevented by excluding air (oxygen).

Glazing is an effective method for protecting whole fish like salmon from the air. Glazing is accomplished by dipping the frozen fish two or three times in fresh cold water to coat it with ice. This method has two disadvantages: (1) At low temperatures the glaze becomes brittle and the ice may fracture. (2) The ice gradually evaporates in storage and the fish has to be reglazed. Glazing is not applicable to fish fillets packed in rectangular cartons.

The Protan Method is a block-freezing method that makes use of a thick aqueous solution containing alginate, certain salts and a dilute acid. The solution is so formulated that, after 10 - 20 minutes, it becomes a firm jelly. The salts, which are added, give the jelly a freezing point between -4° and -5° C. Dispersal of the salt in the jelly does not change during the freezing.

The Protan process is carried out as follows: Fish or fillets are dipped in a Protan solution and

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 ABSTRACTER: Martin Heerdt

3.26 REFRIGERATED CONTAINERS FOR DECKS OF SHIPS

Anonymous
Canadian Refrigeration and Air Conditioning Journal 21, 15 (July 1955)

A British shipping line has recently acquired six specially constructed refrigerated deck-cargo containers. The containers have been awarded Lloyd's R.M.C. unrestricted certificates for a temperature of -10° F.

A model of the container was placed in a heated test room. When the room temperature averaged 110° F., the refrigeration plant was capable of maintaining a temperature of -10° F. while running a maximum of 12 hours per day.

The container is insulated with 8 inches Onazote fitted inside the main framing with a 2 1/2-inch air space between panels and insulation. The containers are provided with lifting slings and awning spars to carry an awning in tropical weather. Both indicating and recording thermometers are fitted at either end of the container.

The refrigerating plant consists of an air-cooled fully automatic Freon 12 plant driven by a marine type 5-hp. motor controlled by a marine type automatic starter. The evaporator is a plain pipe, cross current air cooling unit, fitted with a large circulating fan. A plug door is fitted at one end of the container to provide fresh air for defrosting and is large enough to permit removal of the fan for servicing without having to enter the container. The cooling unit is mounted behind a panel with adjustable louvres that can be closed during defrosting.

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 ABSTRACTER: Kathryn L. Osterhaug

3.5 CONTRIBUTION TO THE STUDY OF THE RATE OF PENETRATION OF SALT IN THE SALTED FISH USED AS FOOD

Charro, A.
An. Bromatol. 5, 443-451 (1953)
Food Science Abstracts 27, 133 (March 1955)

Preliminary work to develop a suitable technique for studying salt penetration in fish flesh is described. Round blocks, about 4 to 5 centimeters in diameter, were prepared from fresh fish (gutted and washed in salt water) with skin intact. Penetration of salt through the skin was prevented by the application of paraffin wax or vaseline to the surface. Before salting, the blocks were placed between sheets of glass, with the flesh surfaces close to the glass. The blocks so prepared were placed in brine, or covered with natural salt or artificial salt mixtures, for definite times (3, 6, 12, or 36 hours), after which residual salt was removed from the surface of the fish, and chlorides were determined in sections of the blocks, using Sendroy's volumetric silver iodate method (after drying and ashing). From figures for the salt contents at 8 different points (the two outermost with skin) of each block, curves were drawn showing the amount of salt absorbed by the fish flesh as a function of time of salting and the depth to which the salt had penetrated. Curves showing the rates of salt penetration in fish salted for different times were then plotted on one graph. The commercial salt used was found to contain 88.18 percent of sodium chloride, 0.39 percent of magnesium chloride, 0.99 percent of calcium sulphate, and 9.20 percent of water. Data for the chemical composition of 27 different samples of salt are tabulated. Results obtained in dry-salting blocks of cod for 3, 6, 12, and 36 hours are also shown graphically.

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JACKETED COLD STORAGE ROOMS

REFRIGERATED CONTAINERS

ALGINATE JELLY GLAZE

RATE OF SALT PENETRATION IN FISH

3.26

The containers have net storage capacities of 450 cubic feet and weigh slightly over 3 tons when ready for operation.

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Smoke tests showed that air velocities inside of the jacketed room were less than 5 linear feet per minute under all conditions. Spacial variations in room temperature were larger with bottom-to-top circulation. The average jacket temperature was about the same for top-to-bottom and bottom-to-top circulation at high rates of flow. During temperature cycling tests the room temperature varied one-third as much as the jacket temperature.

Conclusions. --The use of a jacketed room will reduce surface desiccation of frozen products during storage to negligible amounts. The advantages of top-to-bottom circulation depend on uniform circulation in the jacket. With poor construction or insufficient circulation, bottom-to-top circulation may give better results. Jacketed room operation requires 10 - 15 percent additional power because of the increase in air circulation.

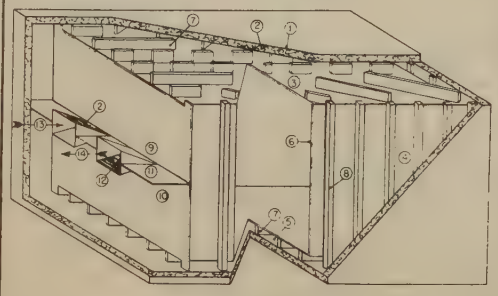

Fig. 2. --Cut-away view of jacketed test room.

(1) Vapor barrier.
(2) Mineral wool insulation 8 in. thick.
(3) Ceiling air space.
(4) Wall ducts.
(5) Floor air space.
(6) Insulated and vapor proof inside wall (asphalt painted plywood over "Ten-test" 1/2 in. thick).
(7) Ceiling and floor air guides, 6 in. deep.
(8) Wall air guides, 2 1/2 in. deep.
(9) Top plenum chamber.
(10) Bottom plenum chamber.
(11) Horizontal partition.
(12) Dampers to change direction of air circulation.
(13) Air in. (14) Air out.

3.234 (Cross Reference: 6.3)

packed in rows in cartons. As soon as the carton has been filled, more solution is added to fill all of the open spaces. Protan-jelly consists of a common salt solution to which sodium alginate, certain salts, and a diluted acid has been added so that the mixture turns to a jelly after 10 to 20 minutes. One thousand kilograms of alginate-jelly mixture contains 40 kilograms of Protan Frostgel-powder and 6 liters of 80-percent lactic acid. The remainder is water. The alginates are able to build solutions of high viscosity with water, to form a film around the fish and thus prevent oxidation. During freezing, the jelly forms a hard icy mass that is practically impervious to air. On thawing, the jelly regains its form at -4° to -5° C., while the fish is still frozen. The thawed jelly between each fish acts as a separating medium. Fish that are frozen in Protan jelly are protected from the air. Because of the hydrophilic properties of the alginates, this jelly does not easily dry out during storage. If drying should occur at a higher temperature, the jelly forms a film which still has a protective effect, although to a lesser extent.

In tests made by the Norwegian Industrial Laboratory at Kristiansund, samples of herring frozen in alginate jelly were taken out of storage every other month and compared with dry frozen herring that had been in storage for the same length of time. After 5 and 6 months' storage, the treated herring was almost fresh, whereas the untreated herring was just on the point of being rejected. After 12 months' storage, the treated herring were still of good quality, whereas the untreated herring showed a tendency toward discoloration and had a distinctly rancid taste. Herring fillets frozen in alginate jelly and inspected after about 7 months' storage at -20° C. were not rancid and had a peroxide number of less than one.

When freezing small herring and sardines for canning, an alginate solution is used that forms a jelly when frozen but on thawing changes into a thick solution which is easily soluble in water and can be washed off. A similar jelly solution has been used to protect shrimp from drying out in frozen storage.

Protan jelly also may be used to protect whale meat and mackerel fillets.

6.131 NEW 6-STAGE STEAM-JET EVAPORATOR

Gemmill, Arthur V.
Food Engineering 27, 48-49 (July 1955)

A new type double-effect steam evaporator recently was installed at a Tunkhannock, Pennsylvania dairy to condense skim milk prior to drying. Similar units are operating successfully on such diverse products as tomato pulp, apple and grape juices. Five reasons for the enthusiastic reception of the unit are: (1) unusual operating economy--3.1 pounds of water are evaporated for each pound of steam used, (2) savings in labor--automatic controls eliminate need for an experienced pan operator, (3) easy cleaning, (4) minimum product losses due to entrainment, and (5) saving in floor space--unit covers approximately one-third less area. The new unit, which is made in Chicago, is of tubular, rising-film design (diagram, over).

Six-stage operation. --A unique system of vertical baffles welded to bottom and top of tube nests in such a manner that spaces above and below them are divided into three separate, equal-sized triangles (patent applied for) enables each effect to operate as a triple-stage evaporator, thus incorporating six stages in two effects.

Liquid to be concentrated enters the first compartment in the base of the first effect of the evaporator. As heat is applied, the liquid rises through the first-stage tubes. When it emerges (partially concentrated) it is diverted by the top baffles and flows down an external pipe to the base of compartment No. 2.

Liquid then travels upward through the tubes of the second stage, is further concentrated, and diverted to the pipe that returns it to the bottom of compartment No. 3 from which it travels upward

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 ABSTRACTER: Martin Heerdt

6.134 DRYING AND QUALITY OF MEAL

Klungsøyr, M.; Boge, G.; and Sparre, T.
Meld. S.S.F., No. 2, 22-30 (1953)
Food Science Abstracts 27, 137-138 (March 1955)

I. Introduction--In flame driers in common use, gases can reach a temperature of 1,000° C, but the temperature of herring meal particles can never be much higher than the adiabatic saturation temperature of the hot gases, provided that the drying is conducted in such a way that the moisture in the meal can diffuse freely to the surface. The behaviour of herring meal was studied previously at the Tjaeere Bay pilot plant (see Vol. 25, Abstr. 2986); the experiments have now been repeated under much improved conditions. The earlier work is summarized in this introduction. Inlet temperatures were 700°, 400° C., and a third temperature which was much lower. The flame-dried meals were compared with a steam-dried meal (control). Both ordinary and whole meals were prepared. For meal with a moisture content of 7 percent to 10 percent, the outlet temperature was about 80° C. With an inlet temperature of 700° C, and outlet temperature of 120° C, the product was very dry and of inferior quality. The quality of the meals was judged by determining the chief B vitamins microbiologically; protein quality was evaluated in chick feeding experiments, in which the herring meal was the sole source of protein.

II. Vitamin investigations with ordinary meal. --In the preliminary experiments reported, the contents of riboflavin, vitamin B_{12}, and pantothenic acid in ordinary meal, prepared from winter herring stored for 6 and 8 days after catching, were determined. Meals were dried at the following temperatures, inlet and outlet, respectively, in the flame drier: (1) 700° to 785° C. and 110° to 122° C. (severe); (2) 700° to 720° C. and 75° to 78° C. (normal); (3) 400° to 410° C. and 81° to 84° C. (normal); and (4) about 100° to 200° C. and about 50° C, with excess of air. A sample of meal was air-dried as

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6.190 THE EVALUATION OF WHALING BYPRODUCTS AS FEEDING-STUFFS

Carpenter, K. J.; Ellinger, G. M.; and Shrimpton, D. H. (Rowett Research Institute, Bucksburn, Aberdeenshire)
Journal of the Science of Food and Agriculture 6, 296-304 (June 1955)

Objectives. --Chemical analyses of whale byproducts were carried out to determine (1) the potential value of whale carcass residues (after oil removal) for animal feeding, (2) the drying conditions permissible without reducing the value of the products, and (3) the analytical methods available for use in grading products of unknown history.

Materials tested. --The factory-ship (vacuum dried) products analyzed were: (1) pure meat meal, (2) grax meal, (3) meat and grax meal, and (4) average production meal. The land-station (flame dried) products analyzed were (5) pure meat meal and (6) average production meat meal. The stick-water products analyzed were (7) condensed whale solubles and (8) condensed whale solubles containing no bone liquors.

Methods used. --Estimations of proximate constituents and selected minerals were made according to the following methods: (1) crude protein according to the method of Alcock (1946), (2) calcium and phosphorus according to the method of Godden (1937), and (3) other analyses according to the Official and tentative Methods of Analysis of the Association of Official Agricultural Chemists (1940). Riboflavin, pantothenic acid, vitamin B_{12}, cystine, methionine, and tryptophane were assayed microbiologically. Lysine was assayed enzymically with a decarboxylase preparation.

Results. --Proximate and mineral composition findings appear in table I, over. Vitamin and amino acid composition findings appear in table II, over. The results of biological tests for assessing the value of protein concentrates as supplements to cereal mixtures for starting chicks are included in table II.

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 ABSTRACTER: Martin Heerdt

6.190 LITERATURE REVIEW OF FACTORS THAT MAY AFFECT PROCESSED FEEDS QUALITY

Karrick, Neva L. (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 17, 25-32 (June 1955)

At present, none of the component substances in fish meal can be used as the criterion of nutritive value. Neither is it possible to state what effect the various processes used in fish-meal production will have on either the component substances or the over-all nutritive value of the meal.

This review was undertaken to obtain information that will aid in the development of analytical methods for determining the nutritive value of fish meal. Thus, before laboratory tests can be developed, it will be necessary to find out (1) which constituents contribute the most to the nutritive value of the meal, (2) what relationship do the constituents have to one another, (3) how does the change in a single constituent affect the over-all nutritive value, and (4) what causes changes in individual constituents?

The following abstract journals are being used in the compilation of the review: (1) Chemical Abstracts, starting with volume 21 (1927); (2) Biological Abstracts, starting with volume 1 (1926) (3) Commercial Fisheries Abstracts, starting with volume 1 (1948); and (4) Food Science Abstracts, starting with volume 22 (1950). In addition, a number of periodicals that were not covered by the abstract journal are being thoroughly covered.

The review is divided into 13 parts covering the following topics:
I. Factors that affect the over-all nutritive value of the product
II. Factors that affect the digestibility of the product

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 ABSTRACTER: Kathryn L. Osterhaug

STEAM-JET EVAPORATOR

WHALE BYPRODUCTS FOR FEED

EFFECT OF DRYING ON MEAL QUALITY

FACTORS AFFECTING FEED QUALITY

6.190 (Cross References: 6.192, 6.195, 6.197, 6.191)

TABLE I

Proximate composition and content of selected minerals of the whale byproducts used in the present feeding trials

	Moisture	Proximate analysis, % Crude protein (N × 6·25)	Ether extract	Ash	Nitrogen-free extract (by diff.)	Selected minerals, % Calcium	Phosphorus	Chlorine
(a) Vacuum-dried Meals								
1. Pure meat	8·6	77·9	7·9	3·6	2·0	0·39	0·61	0·49
2. Grax alone	10·7	83·8	3·1	2·4	0·0	0·04	0·36	0·37
3. Meat and grax	8·7	80·4	5·5	4·8	0·6	0·25	0·81	0·60
4. Average production	11·4	79·5	5·3	4·8	(−1·0)	0·97	0·66	0·64
(b) Flame-dried								
5. Pure meat	8·6	81·0	4·0	3·2	3·2	0·46	0·69	0·06
6. Average production	13·7	79·1	3·3	2·9	1·0	0·44	0·57	0·21
Solubles								
7. Average production	30*	42·5	0·8	4·8	1·9	0·06	0·21	2·28
8. Average production, 1951–52	50*	43·1	0·8	4·3	1·8	0·04	0·23	1·36

* The composition of the whale solubles has been re-calculated to a 50 percent moisture basis, following other workers. The actual moisture contents of samples 7 and 8 were 46.6 and 46.2 percent, respectively.

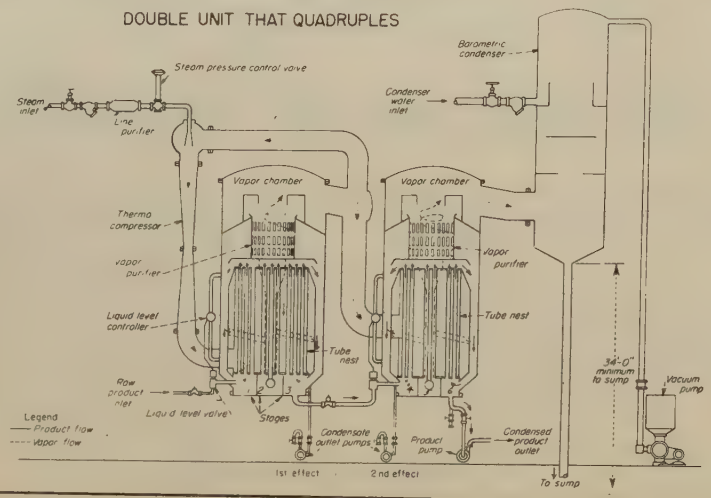
TABLE II

Contents of selected vitamins and amino-acids and gross protein value for chicks of whale byproducts under test.

	Selected B-vitamins, μg./g.			Selected amino-acids, % of the crude protein				Gross protein value (relative to casein = 100)				
	Riboflavin	Pantothenic acid (Mylase)	Vitamin B_{12}	L-Lysine	L-Methionine	L-Cystine	DL-Tryptophan	Trial no. 1	2	3	4	5
(a) Vacuum-dried Meals												
1. Pure meat	6·0	5·0	0·08	9·4	3·6	0·8?	0·9					
2. Grax alone	0·8	3·9	0·07	9·8	3·8	0·47	0·9					
3. Meat and grax	6·0	5·5	0·10	9·5	3·1	0·45	0·9	90	—	—	105	—
4. Average	—	3·6	0·06	8·2	2·9	0·83	—	83	102	102	—	91
(b) Flame-dried								—	108	102	—	—
5. Pure meat	4·0	7·0	0·07	8·4	3·3	0·81	0·75					
6. Average production	—	3·3	0·08	7·8	3·1	0·61	—	96	—	94	—	—
								—	96	93	—	—
Solubles (calc. to 50% dry matter)												
7. 1950–51	0·65	0·4	>0·3	4·9	1·3	<0·1	—					
8. 1951–52	0·9	>0·2		4·5	1·8	<0·1	0·4	—	—	56	56	—
								—	57	59	—	—
Overall means												

6.131

through the third stage. From the top of this stage, the product flows to the base of the second effect and follows a path similar to the path through the first effect.



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III. Effect of raw material on the quality of the product
IV. Protein and its relation to the quality of the product
V. Amino acids and their relation to the biological and nutritive value of the product
VI. Fats, fatty acids, and their relation to the quality of the product
VII. Effect of processing methods on the quality of the product
VIII. Effect of storage on the quality of the product
IX. Keeping quality of the product
X. Biological methods for determining nutritive value and quality of the product
XI. Other analytical determinations
XII. Review articles applying to the problem
XIII. Correlation of methods for determining nutritive value or quality of a product

Parts I through IV and Parts VI and VII have been prepared and duplicated.

6.134

control. The raw material contained 33.2 percent of solids, and the dried meals 96.8 percent, 90.4 percent, 90.6 percent, 90.3 percent, and 87.8 percent, respectively. Samples of press cake and meal were taken every minute during a period of 20 minutes, as soon as constant conditions had been established in the drier; sampling of the meal was begun 15 minutes after that of the press cake, to obtain comparable samples. In each case, the small samples taken during drying were thoroughly mixed to obtain average samples. The raw herring were also sampled. Analytical values showed little variation, and only mean values are tabulated. All the samples were stored in airtight boxes, the press cake and the raw material in the deep-freeze cabinet and the meal in a refrigerator. Results showed that no destruction of B vitamins occurred in series (2) and (3), and in the control; destruction was considerable in (1), and appreciable in (4). Even in (1), destruction of B vitamins was not very serious, since the drying time was short and only the fine particles were much exposed to burning. Meal (1) was the darkest in color, but its appearance was passable by commercial standards. Outlet temperature is more important than inlet temperature, under otherwise optimal conditions. The quality of meal (4) appeared to be the poorest, followed by that of (1), but only pantothenic acid was destroyed in appreciable amount.

7.53 DETERMINATION OF OIL IN FISH MEAL

Stansby, M. E. and Clegg, William (Fishery Technological Laboratory, Seattle, Washington)
Commercial Fisheries Review 17, 16-19 (May 1955)

A simplified extraction procedure for the determination of oil in fish meal is being tested on different types of meals. The primary objective of the investigation is to develop a more rapid method than the present AOAC procedure. At the same time efforts are being directed toward increasing the accuracy of the method when used on old meals. Preliminary results look promising but considerable work will have to be done before the procedure can be recommended.

The present AOAC double extraction procedure involves an acetone extraction, a HCl hydrolysis, and a second acetone extraction. The HCl hydrolysis or digestion is necessary in order to release the bound oil. The bound oil increases with meal storage time, and the rate of increase is greatest for the more unsaturated oils. This procedure is time consuming; consequently, a number of feed-testing laboratories utilize a simple one-step (ethyl-ether) extraction which may give oil content values that are more than 75 percent too low due to unreleased bound oil.

The method herein being tested involves a single extraction in which the meal is refluxed for 18 hours in a solvent containing 92 percent acetone and 8 percent water. The hydrolysis and extraction is carried out in one operation.

Table I, over, gives some of the analytical data obtained.

(over)

COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 12 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Max Patashnik

7.591 ASSAY METHOD FOR LIPOXIDASE IN ANIMAL TISSUE

Boyd, D. H. J. and Adams, G. A.
Can. J. Biochem. and Physiol. 33, 191-198 (1955)
Chemical Abstracts 49, 7037 (1955)

The fact that catalytic oxidation of linoleate emulsions at pH 9.0 by heme pigments is inhibited by KCN, while lipoxidase activity is relatively unaffected, is the basis for an assay for lipoxidase in animal tissues which eliminates the interference of heme compounds. The method was capable of detecting extremely low levels of lipoxidase activity. Application of the method to beef and pork adipose tissue, uncured bacon, cured unsmoked bacon, and rat liver, kidney, spleen, heart, brain, and lung suggested that lipoxidase was not present in these tissues and that the linoleate oxidation was catalyzed by the heme pigments in the exts.

COMMERCIAL FISHERIES ABSTRACTS VOL VIII NO. 12 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. Reprinted in whole

7.593 THE EXPRESSIBLE FLUID OF FISH FILLETS. II. METHOD OF DETERMINING

Banks, A. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 6, 282-286 (May 1955)

Method. --A new method of measuring the amount of expressible fluid in fresh and frozen fish is presented. The method makes use of an inflated rubber bag that presses the fillets uniformly against the inside of a perforated metal cylinder 11 1/2 inches in diameter and 24 inches long. Satisfactory operating conditions were established by subjecting fresh fillets to a range of different pressures, measuring the weight loss, and analyzing the exudate for certain components. The fillets are suspended so that the skin is in contact with the rubber bag, whereas the cut surface is in contact with a piece of muslin that has been placed between the fillets and the cylinder. Space is available so that 6 or 7 medium-sized fillets can be suspended in the cylinder at one time. The fluid that exudes from the fillets after the bag has been inflated to the desired pressure is collected in the bottom of the cylinder and removed for analysis. The amount of fluid is determined from the weight loss of the fillets.

Results and conclusions. --A pressure of 20 pounds/sq. in. on paired fresh fish fillets yielded more fluid than a pressure of 10 pounds/sq. in., but the concentration of solids in the 20-pound/sq. in. press fluid was lower. A smaller but similar difference was obtained with pressures of 10 and 5 pounds/sq. in. At pressures between 5 and 20 pounds/sq. in. some ultrafiltration of intracellular fluid occurred to cause erroneously high values. The amount of fluid obtained at a pressure of 5 pounds/sq. in. was always more than was obtained at 2 pounds/sq. in., but the composition of the fluid obtained under both conditions was, on an average, almost the same.

Pressures of 7 pounds/sq. in. over periods of 6 hours at 2° C. produced slightly more expressible fluid than 4 pounds/sq. in., but the solids content was more or less the same. As the pressure was increased beyond 7 pounds/sq. in. the expressible fluid contained less solid material, consequently,

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COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 12 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

7.593 THE EXPRESSIBLE FLUID OF FISH FILLETS. III. NUCLEIC ACID FROM UNFROZEN COD UNDER VARIOUS CONDITIONS

Love, R. M. (Torry Research Station, Aberdeen, Scotland)
Journal of the Science of Food and Agriculture 6, 287-292 (May 1955)

Introduction. --The amount of deoxypentosenucleic acid (DNA) in the expressible fluid of thawed fillets has been shown to be related to the damage that occurs in muscle cells when they freeze.

Objective. --This study was made to determine the effect of storage in ice, mechanical damage, pressure, differential centrifuging, and fillet size on the DNA concentration of the expressible fluid; and to determine if the DNA was associated with a particular fraction.

Methods. --The method of expressing fluid from the whole fillets and the separation and determination of DNA were described in parts I and II of this series. Expressible fluid was obtained by packing the minced fish muscle into 500-milliliter centrifuge tubes and centrifuging at about 3,000 times gravity for 30 minutes at room temperature.

Effect of storing fish in ice. --Cod fish, 18-22 inches long, that had been stored in ice for 18 hours after being caught were headed and divided into a control and a treatment lot. The control lot of fish was packed in an excess of crushed ice in unsterilized fish boxes and stored in air at 3° C. to 7° C. The treatment lot of fish was thoroughly washed in 10 percent W/V $Na_2CO_3 . 10\ H_2O$, rinsed with water, and held in 2 percent W/W formaldehyde for 2-3 minutes before it was packed in ice in sterilized fish boxes. After 8 days in ice the treatment lot was unpacked, rinsed in 2 percent formaldehyde, and repacked in ice. The treatment lot was stored in the same was as the control lot. The control lot, after 23 days in ice, was foul-smelling and slimy, whereas the treatment lot was firm and without very much odor. Three fish from each lot were removed from the ice after 3, 8, 16, and 23 days of storage, washed to remove obvious slime, filleted, and the fillets pressed. The concentrations of DNA-phosphorus (DNAP) in the expressible fluid are shown in figure 1, over.

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COMMERCIAL FISHERIES ABSTRACTS VOL. VIII NO. 12 PAGE 19
UNITED STATES DEPARTMENT OF THE INTERIOR, FISH AND WILDLIFE SERVICE. ABSTRACTER: Martin Heerdt

OIL IN FISH MEAL

EXPRESSIBLE FLUID DETERMINATION

ASSAY FOR LIPOXIDASE

NUCLEIC ACID CONTENT OF DRIP

7. 593 (Cross Reference: 7. 89)

Effect of mechanical damage.--Skinned fillets were macerated with a domestic mincer and an expressible fluid was obtained by centrifuging the mince as described under Methods. The increase in expressible fillet fluid DNA that occurred after the fish were in ice for 5, 7, and 13 days was 210, 64, and 189 percent, respectively.

Effect of pressure.--Unpressed cod fillets that were left in sloping metal trays for 40 hours at 2.5°C. in a saturated atmosphere yielded 0.410 mg. of DNAP/100 ml. of drip, whereas cod fillets that were pressed at 7 lb./sq. in. for 6 hours yielded 0.189 mg. of DNAP/100ml. of press fluid.

Effect of differential centrifuging of expressible fluid.--When expressible fluid mixed with sucrose to give an 0.25M concentration of sucrose was centrifuged at 24,000 times gravity for 60 minutes at 0°, a transparent yellowish pellet that contained 5.9 percent of the total available DNAP was recovered. Prior to centrifugation, 100 grams of the dried expressible fluid contained 3.55 milligrams of DNAP, whereas after centrifugation 100 grams of the dry pellet contained 11.7 mg. of DNAP.

Effect of fillet size.--The effect of an increase in the thickness of the fillet or the length of the fish on the DNAP in the expressible fluid is shown in figure 2 below.

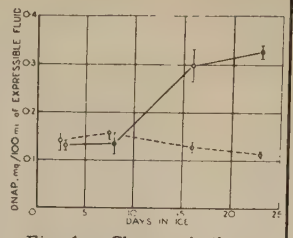

Fig. 1.--Changes in the deoxypentosenucleic acid phosphorus (DNAP) in the expressible fluid of cod fillets, from fish stowed in ice for increasing lengths of time.
⊙——⊙ Control
⊙----⊙ Fish washed in formaldehyde

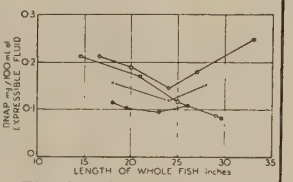

Fig. 2.--Relation between deoxypentosenucleic acid phosphorus (DNAP) in the expressible fluid of cod fillets and the size of the fish.
⊙——⊙ Fish caught in December, 3 days in ice
⊡——⊡ Fish caught in February, 4 days in ice
X——X Fish caught in February, 6 days in ice
●——● Fish caught in April, 3 days in ice

7. 591

Table I

Expressible fluid obtained by pressing paired 3-days'-iced fish fillets at 20 and 10 lb. sq. in.

Pressure, lb. sq. in	Time, hours	Expressible fluid, g. 100 g. of fish	Solids, g./100 g. of fluid	Coagulable N, g./100 g. of fluid	Non-coagulable N, g. 100 g. of fluid
20	0–1	6·2	4·88	0·40	0·22
	1–2	3·1	5·58	0·40	0·27
	2–3	1·9	6·00	0·47	0·28
	0–3	11·2	5·26	0·41	0·25
10	0–1	5·9	0·30	0·54	0·22
	1–2	3·0	5·62	0·40	0·16
	2–3	1·5	6·22	0·49	0·31
	0–3	10·4	6·09	0·51	0·23

Table II

Expressible fluid obtained by pressing paired 3-days'-iced fish fillets at 10 and 5 lb./sq. in.

Pressure, lb./sq. in.	Time, hours	Expressible fluid g./100 g. of fish	Solids, g./100 g. of fluid	Coagulable N, g./100 g. of fluid	Non-coagulable N, g./100 g. of fluid
10	0–1	4·2	6·76	0·39	0·33
	1–2	1·7	6·92	0·37	0·36
	2–3	2·5	7·70	0·57	0·39
	0–3	8·4	7·07	0·61	0·35
5	0–1	4·7	7·07	0·61	0·36
	1–2	1·9	7·59	0·72	0·33
	2–3	1·5	8·16	0·69	0·37
	0–3	8·1	7·39	0·65	0·35

Table IV

Expressible fluid obtained by pressing paired fillets at 7 and 4 lb./sq. in.

Pressure, lb./sq. in.	Time, hours	Expt. 1 Expressible fluid, g./100 g. of fish	Expt. 1 Solids, g./100 g. of fluid	Expt. 2 Expressible fluid, g./100 g. of fish	Expt. 2 Solids, g./100 g. of fluid	Expt. 3 Expressible fluid, g./100 g. of fish	Expt. 3 Solids, g./100 g. of fluid
7	0–2	4·0	7·51	4·8	6·89	5·0	7·72
	2–4	1·6	7·44	2·3	7·13	2·2	7·83
	4–6	1·6	8·09	1·6	6·63	1·7	7·08
	0–6	7·2	7·62	8·7	6·90	8·9	7·74
4	0–2	2·9	7·43	5·0	6·59	4·2	8·09
	2–4	1·8	7·59	1·7	6·93	2·1	7·83
	4–6	1·5	8·11	1·1	7·20	1·8	8·70
	0–6	6·2	7·64	7·8	6·77	8·1	8·13

7. 593 (Cross Reference: 7. 89)

this value was selected for future work. The amount of fluid obtained also depends on the length of time the fillets are subject to pressure, but the rate at which the fluid is produced varies with time and not always in the same way.

7. 53

Table I - Comparison of Analytical Data Obtained on the Oil Content of Various Fish Meals by the AOAC Procedure and by the Reflux Procedure

Species of Fish from Which Meal Was Made	Plant Producing Meal	Oil Content of Meal			
		AOAC Procedure (Initial Value)	Reflux Procedure Using 92-Percent Acetone		
			Initial Value	Value after Meal Was Stored 1 Month	Value after Meal Was Stored 1 Month
	Number	Percent	Percent	Percent	Percent
Cod	1	8.5	8.3	-	-
Herring	1	13.1	13.3	13.0	13.3
Herring	2	12.1	13.5	12.8	12.1

0.38 THE CONVERSION OF INACTIVE PHOSPHORYLASE TO PHOSPHORYLASE B AND PHOSPHORYLASE A IN LOBSTER MUSCLE EXTRACT

Cowgill, Robert W. and Cori, Carl F. (From the Department of Biological Chemistry, Washington University School of Medicine, St. Louis, Missouri)
Journal of Biological Chemistry 216, 135 (September 1955)

Extracts prepared from the tail muscle of lobsters maintained in a tank contain an inactive form of phosphorylase which is converted to phosphorylase b and then to phosphorylase a during incubation of extract.

0.38 SUCCINIC DEHYDROGENASE ACTIVITY IN THE GOLDFISH GILL

Sexton, Alan W. and Russell, Robert L.
Science 121, 342 (March 4, 1955)

It is suggested that this work offers additional evidence in favor of the theory that succinic dehydrogenase is involved in active sodium transportation.

0.38 QUICK-FREEZING APPLIED TO MEAT CONSERVATION. II. INFLUENCE ON THE PROTEOLYTIC ACTIVITIES OF CATHEPSINS

Monzini, Andrea
Ann. sper. agrar. 7, 1801-1806 (1953)
Chemical Abstracts 48, 5390 (1954)

1.20 THE NORWEGIAN WINTER HERRING FISHERY II.

Egenaes, W. Nitter
Norwegian Fishing News 2, 4 (1955)

1.20 PACIFIC SARDINE (PILCHARD) EGGS AND LARVAE AND OTHER FISH LARVAE, PACIFIC COAST, 1953

Ahlstrom, Elbert H. and Kramer, David
Special Scientific Report: Fisheries No. 155, Washington, D. C., (May 1955)

1.20 NORWEGIAN STUDIES ON THE BACTERIOLOGY OF SEMI-PRESERVED HERRINGS

Hjorth-Hansen, Sverre
Symposium on cured and frozen fish technology, Swedish Institute for Food Preservation Research, Göteborg, No. 100, Chapter 3 (November 1953)

(Abstract of this article appears under 3.8 page 9 - November 1955)

1.87 LOBSTER TRAP EXPERIMENTS

Anonymous
Trade News 7, 10-11, 22 (January 1955)

(Abstract of this article appears under 2.1128 page 7 - October 1955)

1.87 FLUORIMETRIC AND BIOLOGICAL DETERMINATION OF ESTROGENS IN THE EGGS OF THE AMERICAN LOBSTER (HOMARUS AMERICANUS)

Donahue, Kenneth
Proc. Soc. Exptl. Biol. Med. 69, 79-81 (1948)
Chemical Abstracts 43, 773 (1949)

A preliminary study, utilizing recently developed fluorimetric technique and standard biol procedures, indicates that the eggs of the American lobster contain estrogenic substance equiv. to at least 100 I.U. per 100 g. of eggs.

1.87 THE HISTOLOGY OF THE FLEXOR TENDON IN THE CRUSHING CLAW OF THE LOBSTER

Knight, A. P. (Queen's University, Kingston, Ontario, Canada)
Contributions to Canadian Biology (Department of Naval Service) 185-188 (1921)

Includes eight figures

2.111 STUDIES ON ANTISEPSIS OF FISHING YARNS. III. ANTISEPTIC TREATMENTS WITH CU-NAPHTHENATE AND OTHERS

Fukuda, Hironari and Higuchi, Toshiaki
Bulleting of the Japanese Society of Scientific Fisheries 20, 288 (1954) (English summary, figure, and tables)

Cotton fishing yarns were dipped first in 10- to 20-percent solutions of naphthenic acid dissolved in 1-percent ammonia and second, in a 5-percent solution of one of a number of different metallic salts. Hg and Cu-naphthenates were most effective.

2.111 MICROBIOLOGICAL STUDIES ON THE WEAKENING OF FISHING NETS. VII. ON THE MODE OF CELLULOSE-DEGRADATION BY MARINE AEROBIC CELLULOSE-DECOMPOSING BACTERIA. VIII. THE MICROBIOLOGICAL DETERIORATION OF FISHING NETS DURING STORAGE

Kadota, Hajime
Bulletin of the Japanese Society of Scientific Fisheries 20, 451-457 (1954) (English summary, figure and tables)

In fishing nets, under wet conditions, the proportion of Cytophagas to the total marine aerobic cellulose-decomposing bacteria increases during storage at 9° to 15° or at 30° C.

2.119 ELECTRICAL MEASUREMENTS IN THE STUDY OF IMMERSED PAINT COATINGS ON METAL. I. COMPARISON BETWEEN CAPACITANCE AND GRAVIMETRIC METHODS OF ESTIMATING WATER-UPTAKE

Brasher, D. M. and Kingsbury, A. H.
Journal of Applied Chemistry 4, 62-72 (February 1954)

An electrical capacitance method of estimating the water-uptake of paint films on metal immersed in sea water has given, for many paint formulations, values agreeing with those obtained by a gravimetric method.

2.119 STUDIES ON THE FIXED NETS IN FUNKA BAY. II. ON THE AUTOMATIC RECORDING ROPE TENSION METER

Hobayashi, Kiichiro and Nishizawa, Satoshi
Bulletin of the Faculty of Fisheries, Hokkaido University 4, 112-117 (May 1953)

2.3 NEW AUTOMATIC FISH SCALING MACHINE

Anonymous
Canner 121, 26 (August 22, 1955)

2.3 VERSATILE UNIT PROTECTS FISH DURING SCALING

Anonymous
Food Engineering 27, 139 (September 1955)

Uniformly distributed pressure, applied to fish during scaling in this automatic unit is said to prevent cutting or breakdown of flesh structure.

Versatile scaler has a capacity of 5,000 to 9,000 pounds per hour, depending upon fish size and type, and automatically adjusts for sizes from 1/2 to 9 pounds.

3.19 EFFECT OF RADIOACTIVE-RAY ON THE VITAL COMPONENTS AND SUBSTANCES OF ORGANISM. I. CHANGE OF VITAMIN C BY GAMMA-RAY IRRADIATION

Okada, I.; Osakabe, I.; Kikuchi, T.; Fukushima, K.; Yamashita, H.; Sasaki, S.; Akatsuka, M.; and Watanabe, W.
Bulletin of the Japanese Society of Scientific Fisheries 20, 564 (1954)

3.19 EXPERIMENT ON THE ANTISEPSIS OF FOODS BY RADIOACTIVE-RAY. II. III. PRESERVATION OF FOODS BY GAMMA RADIATION.

Okada, I.; Osakabe, I.; Kikuchi, T.; Fukushima, K.; Yamashita, H.; Sasaki, S.; Hashimoto, K.; Akatsuka, M.; and Watanabe, W.
Bulletin of the Japanese Society of Scientific Fisheries 20, 563a-563b (1954)

3.19 QUICK-APPRAISAL GUIDE ON FOOD IRRADIATION

Robe, Karl
Food Processing 16, 58 (September 1955)

3.19 RADIATION STERILIZATION OF FOODS

Anonymous
Journal of Agricultural and Food Chemistry 2, 1260 (December 8, 1954)

3.19 RADIATION COSTS CALCULATED IN PILOT-PLANT PROGRAM

Jeppson, Morris R.
Food Engineering 27, 100 (March 1955)

Pre-cut meats in packages up to 0.7 inches thick can be pasteurized by electron radiation at a calculated cost of $1.06 per ton. Complete sterilization can be achieved for 2 cents per pound. Pasteurizing in carton quantities by converting the electron beam to X-rays increase the expense to about 1/4 cents per pound.

3.231 BASIC ELECTRICAL CONTROLS FOR REFRIGERATION SYSTEMS

Wolfberg, Howard (Engineer Central District, York Corporation, Chicago, Illinois)
Industrial Refrigeration 129, 27 (August 1955)

3.231 BASIC ELECTRICAL CONTROLS FOR REFRIGERATION SYSTEMS

Wolfberg, Howard
Industrial Refrigeration 129, 30 (July 1955)

3.236 BREADED MEATS

Anonymous
Food Engineering 27, 77, 180 (March 1955)

Four-ounce portions of pork cutlets, veal cutlets, veal grill steaks, and boneless pork chops are now being breaded automatically and packed 40 to 42 portions into foil-lined and foil-layered cartons for the institutional trade.

3.236 TECHNIQUES OF FREEZING AND STORING FISH AND SEAFOOD. PART III

Butler, Charles
Frosted Food Field 20, 12-14, 41 (May 1955)

(Abstract of this article appears under 2.118 page 7 - September 1955)

3.249 INVESTIGATION OF CHANGES THAT TAKE PLACE IN FOODS DURING STORAGE IN THE FROZEN CONDITION

Lund, Arnold J.
Annual Report of the Hormel Institute, University of Minnesota, 69-74 (1953-54)

Freezing injury to living yeasts caused loss of viability, loss of metabolic activity, and disruption of cellular equilibrium such that soluble constituents leak out of the cell. The activity rates of bacterial protease and lipase was so extremely low that they probably contribute little to flavor changes in frozen foods. Storage at -15° C. for a period of 300 days does not permit changes in frozen pork which can be measured by chemical means.

3.249 THE GREEN DISCOLORATION OF FROZEN SWORDFISH (KIPHIAS GLADIUS). I. ISOLATION OF ISOVALERIC ACID-LIKE SUBSTANCE FROM GREEN COLORED FLESH

Amano, K.
Bulletin of the Japanese Society of Scientific Fisheries 15, 469-475 (1950)
Chemical Abstracts 49, 3436 (1955)

4.11 A RAPID METHOD FOR THE ESTIMATION OF UNSATURATION OF FATS AND OILS BY USE OF HYPOCHLOROUS ACID REAGENT

Mukherjee, S.
Journal of the American Oil Chemists' Society 32, 351 (June 1955)

The estimation is conducted with an aqueous solution of sodium hypochlorite reagent, and no oil solvent is required for the estimation. A reaction time of 4 to 5 minutes is recommended. The method compares favorably with the standard procedures.

4.11 GLYCERIDE COMPOSITION OF FATS AND OILS DETERMINED BY OXIDATION AND CRYSTALLIZATION METHODS

Luddy, Francis E.; Fertsch, George R.; and Riemenschneider, Roy W.
Journal of the American Oil Chemists' Society 31, 266-268 (June 1954)

4.11 UREA ADDUCTS OF FATTY ACIDS. II. SEPARATION OF CASTOR-OIL FATTY ACIDS

Mehta, T. N.; Rao, C. V. N.; Rao, B. Y.; and Chudgar, N. M.
Journal Indian Chem. Soc., Ind. & New Ed. 17, 23-29 (1954)
Chemical Abstracts 49, 4306 (1955)

4.63 THE KEEPING PROPERTIES OF VITAMIN A IN SOLUTION

Basu, U. P. and Bhattacharya, Sukhamoy
Indian Pharmacist 5, 172-174 (1950)
Chemical Abstracts 44, 11031 (1950)

4.63 STABILIZING EFFECT OF COMMERCIAL ANTIOXIDANTS ON VITAMIN A CONCENTRATE

Kinumaki, Toyosuke and Tabei, Kikuko
Bulletin of the Japanese Society of Scientific Fisheries 20, 539 (1954)

4.64 FUMARIC ACID AS AN ANTIOXIDANT FOR FATS

Glimm, E. and Rozdilskyj, M.
Fette u. Seifen 51, 389-391 (1944)
Chemical Abstracts 44, 6657 (1950)

4.65 FEEDING TESTS WITH GALLIC ACID ESTER ANTIOXIDANTS

Nilson, Hugo W.; Bender, Maurice; and Darling, Dorothy B.
Commercial Fisheries Rev. 12, 19-20 (1950)
Chemical Abstracts 44, 9019 (1950)

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Bulletin of the Japanese Society of Scientific Fisheries
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Canadian Journal of Chemistry
Canadian Journal of Technology
Canner
Chemical Abstracts
Chemical and Engineering News
Chemical Engineering
Chemistry and Industry
Commercial Fisheries Review
Drug and Cosmetic Industry
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Federation Proceedings
Feedstuffs
Fisheries Newsletter (Australia)
Fish. Res. Bd. Can., Prog. Repts. Atlantic Coast Stas.
Fish. Res. Bd. Can., Prog. Repts. Pacific Coast Stas.
Fisherman
Fishing Gazette
Flour and Feed
Food Engineering
Food Manufacture
Food Packer
Food Preservation Quarterly
Food Processing
Food Research
Food Science Abstracts
Food Technology
Frosted Food Field
Industrial and Engineering Chemistry
Industrial Refrigeration
Journal of Agricultural and Food Chemistry
Journal of Applied Chemistry
Journal of Biological Chemistry
Journal of Home Economics
Journal of Nutrition
Journal of the American Chemical Society
Journal of the American Dietetic Association
Journal of the American Oil Chemists' Society
Journal of the Association of Official Agricultural Chemists
Journal of the Fisheries Research Board of Canada
Journal of the Science of Food and Agriculture
Maine Coast Fisherman
Meldinger Fra SSF (Herring Industry, Norway)
Modern Packaging
Modern Refrigeration
National Fisherman
National Provisioner
Nature
Nutrition Reviews
Pacific Fisherman
Pan American Fisherman
Poultry Science
Practical Home Economics
Progressive Fish-Culturist
Quick Frozen Foods
Refrigerating Engineering
Report of the Food Investigation Board (Great Britain)
Science
Southern Fisherman
Trade News (Fisheries Department, Canada)
Western Fisheries
World Fishing

Articles chosen for abstracting or inclusion as bibliographical references are those deemed of interest to the commercial fisheries and to fishery technological laboratories. Occasionally pertinent articles from sources other than the above listed publications are included. Biological papers are generally omitted.

4.8 THE CHEMICAL UTILIZATION OF FATS AND OILS. III. ESTER-AMIDES OF CERTAIN AMINOALCOHOLS AS PLASTICIZERS

Silverstein, R. M.; Mosher, C. W.; and Richards, L. M.
Journal of the American Chemists' Society 32, 354 (June 1955)

Optimum plasticizer properties were attained with the C_8 and C_{10} diester-amides of diethanolamine. The mixture of caprylic and capric acids as obtained from coconut oil was convenient and economical.

4.8 MARINE OILS. PRODUCTION, GENERAL CHEMISTRY, AND UTILIZATION

Hetchler, John D.
Journal of the American Oil Chemists' Society 31, 503-508 (November 1954)

(Abstract of this article appears under 4.7 page 3 - March 1955)

4.89 IODIZED LIVER OIL OF THE BASKING SHARK AS A RADIOGRAPHIC CONTRAST MEDIUM

Skeller, H. J. and Spence, J. W.
Chemistry and Industry, No. 14, 388 (April 2, 1955)

(Abstract of this article appears under 4.29 page 15 - September 1955)

6.19 USE OF VITAMIN A IN FORMULA FEEDS ANALYSED

Wilgus, H. S.
Feedstuffs 27, 18, 20, 22-24 (May 28, 1955)

(Abstract of this article appears under 4.90 page 11 - October 1955)

6.19 ACCESSORY GROWTH FACTORS FOR CHICKS IN DISTILLERS' DRIED SOLUBLES

Scott, H. M.
Proceedings of 10th Distillers' Feed Conference, pp. 43-46 (March 3, 1955)

Distillers' dried solubles, alfalfa meal, dried whey, liver powder, and fish meal improved chick growth when added to a purified diet. The factor in distillers' dried solubles apparently was distinct from the factors in the other four feeds.

6.3 ENGINEERING AND ECONOMIC ASPECTS OF MARINE PLANKTON HARVESTING

Jackson, Philip (Institute of Seaweed Research, Scotland)
Extrait du Journal Conseil International Poul l'Exploration de la mer, 20, No. 2 (1954)

Plankton harvesting is not economically feasible unless and until areas of greatly increased population density can be either located or produced by artificial means, or a radically novel and cheaper method of harvesting becomes available. Estimated cost of harvesting is F 1800 per dry ton of plankton

6.3 STUDIES ON MUCILAGE FROM THE SEAWEED EUCHEUMA SPINOSUM (L.) J. AG--I. CHANGES IN CHEMICAL COMPOSITION DUE TO VARIOUS TREATMENTS. ENGLISH SUMMARY AND TABLES.

Nakamura, Takehiko
Bulletin of the Japanese Society of Scientific Fisheries 20, 501 (1954)

6.3 VITAMIN B_{12} DISTRIBUTION IN NATURE

Anonymous
Nutrition Reviews No. 4, 113-115 (April 1955)

(Abstract of this article appears under 5.41 page 13 - November 1955)

7.43 A RAPID METHOD FOR THE DETERMINATION OF MOISTURE CONTENT IN FISH MEAT

Tsuchiya, Yasuhiko and Nakano, Tomo (Department of Fisheries, Faculty of Agriculture, Tohoku University, Sendai, Japan)
Tohoku Journal of Agriculture Research 5, 93 (December 1954)

The rapid method for the determination of moisture in fish was established by measuring the specific gravity of an aqueous solution of methyl alcohol that was used as a dehydration agent of fish meat.

7.43 DEVELOPMENT OF BUCKEYE CONTINUOUS MOISTURE METER FOR OIL-BEARING MATERIALS

Maskey, D. F.; Ledbetter, D. M.; and Craig, H. L.
Journal of the American Oil Chemists' Society 32, 344 (June 1955)

The meter may be successfully used on all materials which will flow uniformly through the test cell and have a moisture range between 8 and 16 percent.

7.43 SECTION SAMPLING OF SALT CODFISH FOR WATER CONTENT

Templeman, W.
Fisheries Research Board of Canada, Progress Reports of the Atlantic Coast Stations, No. 60, 15-19 (December 1954)

(Abstract of this article appears under 3.5 page 5 - April 1955)

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8.42 CHEMICAL STUDY OF MOLLUSK SHELLS FROM THE CHILEAN COAST

Pinto Alvarez, Anibal and Zapata B., Olga
Congr. farm. bioquim. peruano y convencion farm. norte, Actas y Trabajos, 286-295 (1953)
Chemical Abstracts 49, 6489 (1955)

H_2O, org. matter, CO_2, SiO_2, Fe_2O_3, Al_2O_3, and CaO are determined in the shells of 21 species of mollusks. The results seem to be the same whatever the species of marine mollusk.

8.42 DETERMINATION OF INORGANIC SUBSTANCES IN THE LABYRINTHINE FLUIDS

Jensen, C. E. and Vilstrup, T.
Acata. Chem. Scand. 8, 697-698 (1954)
Chemical Abstracts 49, 3424 (1955)

The endo- and perilymph of the shark (Acanthias vulgaris) contained, resp., 75.47 and 51.75 mg. percent S, 2.80 and 2.47 millimoles percent Na, 0.60 and 0.37 millimoles percent K. An emission spectrogram is presented to indicate the occurrence of various inorganic elements including B, Si, P, Fe, Mg, Ni, Al, and Ca.

8.59 COMPOSITION OF THE SCLEROPROTEINS (CONCHIOLINS) OF MOLLUSK SHELLS

Roche, Jean; Ranson, Gilbert; and Eysseric-Lafon, Marcelle (Lab. marine biol., Concarneau, France)
Compt. rend. Soc. biol. 145, 1474-1477 (1951)
Chemical Abstracts 46, 7662 (1952)

8.59 EUPHAUSIOPSIN, A NEW PHOTOSENSITIVE PIGMENT FROM THE EYES OF EUPHAUSIID CRUSTACEANS

Kampa, Elizabeth M.
Nature 175, 996 (June 4, 1955)

The eyes of euphausiid crustaceans which previously had been shown to contain large amounts of vitamin A are shown to contain both astaxanthin and a hitherto unidentified photosensitive pigment for which the author proposes the name "euphausiopsin."

8.59 SOME UNUSUAL CAROTENOIDS FROM TWO NUDIBRANCH SLUGS AND A LAMPRID FISH

Goodwin, T. W. and Fox, D. L.
Nature 175, 1086-1087 (June 18, 1955)

(Abstract of this article appears under 8.612 page 17 - November 1955)

9.15 A SURVEY OF THE PARASITES OF FRESHWATER FISHES FROM THE MAINLAND OF BRITISH COLUMBIA

Bangham, Ralph V. and Adams, James R.
Journal of the Fisheries Research Board of Canada 11, 673 (November 1954

Examination of 5,456 fish of 36 different species during 1951 and 1952 showed 4,925 or 90 percent to be infected with at least one species of parasite. Records include fish from many lakes and streams of the Columbia and Fraser drainages and from a few localities in the Skeena, Peace, Laird and Skagit drainages.

9.15 CRITICAL REVIEW OF BIOLOGY AND CONTROL OF OYSTER DRILLS UROSALPINX AND EUPLEURA

Carriker, Melbourne Romaine
Special Scientific Report: Fisheries No. 148, Washington, D. C., (April 1955)

9.15 POLLUTION AND THE FISHERIES

Pritchard, A. L.
Trade News 7, 7 (July 1954)

9.16 BRACKISH WATER FISH FARMING

Thomson, J. M.
Fisheries Newsletter 14, 17 (May 1955)

9.16 LET'S FARM THE SEA NOW

MacDonald, Donald
World Fishing 4, 30 (July 1955)

9.6 FISHING BOATS OF THE WORLD

Traung, Jan-Olof
Trade News 7, 21 (April 1955)

9.7 INTERNATIONAL FISH MARKETING TRAINING CENTER, HONG KONG

Anonymous
FAO Fisheries Bulletin 7, 182 (October-December 1954)

The FAO/ETAP International Fish Marketing Training Center was held in Hong Kong from July 12 to August 21, 1954 at the invitation of the Government of the United Kingdom, and in cooperation with the Government of Hong Kong, the Indo-Pacific Fisheries Council, and participating governments.

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